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Pharmacology



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Version 5.3

Corrected, Updated, Lighter

PLAB 1 Keys is for **PLAB-1** and **UKMLA-AKT** (Based on the New MLA Content-Map)

With the Most Recent Recalls and the UK Guidelines

ATTENTION: This file will be updated online on our website frequently!

(example: **Version 2.1** is more recent than **Version 2**, and so on)

Key
1

The Most Important Side Effects to Know

All these are so important and were asked in previous exams.

☐ **Calcium Channel Blocker** (e.g., Diltiazem, Verapamil, Amlodipine)

→ Ankle Swelling, Gingival Hyperplasia. (2 swellings: ankle and gingiva).

☐ **Beta-blockers** (e.g., Atenolol, Bisoprolol)

→ Bronchoconstriction (Wheezes, SOB, heavy chest...).

☐ **Beta-Agonist** (e.g., Salbutamol)

→ Tachycardia/ Palpitations/ Muscle twitching and tremors/ Shaky hands/ Hypokalemia. Remember that higher or frequent salbutamol → hypokalemia.

☐ **ACE inhibitors** (e.g., lisinopril, enalapril, ramipril)

→ Dry cough (Give ARBs e.g., Losartan instead -important-),

Other: Hyperkalemia.

Other: Precipitate **recurrent falls** in patients who have postural hypotension.

☐ **Diuretics**

✓ **Loop diuretics (furosemide)**

→ Hyponatremia, Hypokalemia, Gout (hyperuricemia).

✓ **Thiazide-like diuretics (bendroflumethiazide)**

→ Hyponatremia, Hypokalemia, Gout, Postural hypotension, Hyperglycemia.

✓ **Potassium sparing diuretics (spironolactone)**

→ Hyponatremia, Hyperkalemia, Gynecomastia (breast enlargement).

☐ **Metoclopramide**

✓ **Extrapyramidal effects**

→ dystonia, akathisia, parkinsonism, bradykinesia, tremors.

✓ **Neuroleptic malignant syndrome**

→ high fever, sweating, tachycardia, agitation, confusion, muscle rigidity, neck stiffness.

■ **Haloperidol** → Sexual Dysfunction + Gynecomastia.

So, in a man who has erectile dysfunction, one cause → Haloperidol

■ **Fluoxetine (SSRI)**

→ Anorgasmia (delayed ejaculation).

Other: hyponatremia → Falls, gait instability, confusion.

So, in a man who has erection but no or delayed ejaculation → Fluoxetine

■ **Citalopram/ Sertraline (SSRI)**

✓ **Acute closure angle glaucoma** → urgent ophthalmology referral.

✓ **Erectile dysfunction.**

✓ **Hyponatremia** → confusion, unstable gait → falls

So, another side effect of SSRIs in the elderly → ↑ risk of **falls**.

■ **Duloxetine (SNRI)**

→ ↑ Risk of **falls** especially in the elderly.

So, both **SSRIs** (eg, **Citalopram, Sertraline**) and **SNRIs** (eg, **Duloxetine**) can cause frequent **falls** especially in the elderly.

SSRI → Falls (due to hyponatremia).

SNRI -Duloxetine- → Falls (due to postural hypotension)

▣ **Gliflozin eg, Dapagliflozin (SGLT-2 inhibitors) (for type 2 DM)**

→ ↑ Risk of genital infections (eg, **balanoposthitis** = inflammation of the glans **penis** and prepuce → erythema, itching) → **stop or change medication**.

▣ **Clozapine (atypical antipsychotic)**

→ Agranulocytosis (neutropenia) + Postural hypotension + ↑ body weight.

▣ **Methotrexate MTX (Anti-metabolite, used in cancer Rx and in immune disease eg, RA)**

- **Pulmonary toxicity** (Cough, dyspnea, fever) → Stop if suspected pneumonitis.
- **Bone marrow suppression** → Stop MTX if significant ↓ in WBCs/Platelets.
- **Liver and GI** → Stop MTX if abnormal liver enzymes, stomatitis, diarrhea.

▣ **Others:**

✓ Although uncommon, one of the side effects of statins is Rhabdomyolysis.

✓ **Atorvastatin**

→ **statin-associated myalgia** (muscle pain in arms, shoulders, legs)

✓ Although uncommon, one of the side effects of co-amoxiclav “Augmentin” is cholestatic hepatitis “drug-induced hepatotoxicity” especially in the elderly.

✓ One of the feared side effects of **clozapine** is **agranulocytosis** (severely low WBCs especially neutrophils ie, **neutropenia**). Agranulocytosis manifests as (Fever, Chills, Muscle aches, Headache, sore throat).

The next step is to request **Full Blood Count** (FBC) to look for neutrophils count.

✓ Another common S/E of **clozapine** is → **Postural hypotension and weight gain**.

✓ **Carbimazole** (an antithyroid medication used for hyperthyroidism) can also cause **agranulocytosis** (ie, **neutropenia**).

✓ Be aware that **glucocorticoids** (eg, **prednisolone**) can cause leucocytosis and thrombocytosis (**↑WBCs**, **↑Platelets**).

✓ **Antipsychotic medications** (eg, **risperidone**) can elevate **↑ prolactin** levels, and causing **galactorrhea** (milk discharge from nipples).

✓ **Oxybutynin** (anticholinergic) can cause **dry eye** and **dry mouth**.

✓ **Spironolactone** (aldosterone antagonist) can cause **breast enlargement (gynecomastia)**.

✓ **Citalopram, Fluoxetine** (SSRIs) can cause **Hyponatremia (SIADH)** → **confusion, lethargy**.

Key 2 When replacing one analgesic with another, the dose should be modified as follows:

■ From [Oral morphine to Subcutaneous morphine] → ($\div 2$)

■ From [Oral morphine to Subcutaneous diamorphine] → ($\div 3$)

■ From [Oral tramadol to IV morphine] → ($\div 20$)

Key 3 A palliative patient is being receiving end-of-life care (at home) by his family. He has multiple seizures. What is the best route to receive Benzodiazepines?

“at home”, “end-of-life care”

→ Rectal “diazepam” (cheaper, more available)

Key 4 Important and can be asked in different forms

The most important Side effects of Diuretics

Loop diuretic	Thiazide-like diuretics	Potassium-sparing diuretics
e.g. Furosemide bumetanide	e.g. Bendroflumethiazide Indapamide	e.g. Spironolactone eplerenone

Hyponatremia	Hyponatremia	Hyponatremia
Hypokalemia	Hypokalemia	Hypokalemia
Gout (hyperuricemia)	Gout (hyperuricemia)	Gynecomastia
	Postural Hypotension	
	Hyperglycemia (impaired glucose tolerance)	

Examples

■ A diabetic patient with HTN started taking anti-hypertensive medication. A few months later, his fasting blood glucose is 15 mmol/l. what is the most likely drug he has been taking?

Hyperglycemia → **bendroflumethiazide** (Thiazide-like diuretics)

■ A congestive heart failure patient has started taking Furosemide. What electrolyte disturbances are expected?

→ **Hyponatremia (< 135) + Hypokalemia (< 3.5)**

Key 5 A 4 YO child has been brought to the ED unconscious after he has ingested methadone mistakenly. Naloxone has been given. However, after a while, he has become drowsy again. Why?

→ **Naloxone has shorter a half-life compared to methadone.**

(this is why repeated doses of naloxone are sometimes given)

Key 6 There are **4 medications** that need to be stopped if a patient presents with Diarrhea/ Vomiting (**Risk of Dehydration**) until symptoms resolve:

DAMN

- 1) **Diuretics** (eg, Furosemide, bendroflumethiazide) → (↑ dehydration).
- 2) **ACE inhibitors** (eg, enalapril) and **ARBs** (eg, Losartan) → (AKI).
- 3) **Metformin** → (↑ lactic acidosis in a patient with dehydration).
- 4) **NSAIDs** → (AKI)

Risk of **D**ehydration (Hx of **D**iarrhea/vomiting) → stop **DAMN**

A patient with a Hx of 3 days abdominal pain, fever, diarrhea and vomiting. He is on multidrug for DM, HTN, long term management of depression. His medication history includes metformin, losartan and sertraline. His urea and creatinine are found to be mildly elevated. What is the most appropriate action?

→ **Stop Metformin and Losartan (ARBs) Temporarily.**

Key 7	<p>Painful Muscle Spasm → Give muscle relaxant eg, Baclofen</p> <p>■ This might be asked in the exam: For example, a long Scenario of a patient with a history of bone metastasis causing bone pain that is CONTROLLED with morphine but there is still muscle spasm that is irritating or painful.</p> <p>Rx → Baclofen (a muscle relaxant can be given as an adjuvant).</p> <hr/> <p>Careful:</p> <p>Metoclopramide is an antiemetic that blocks dopamine receptors and thus may cause parkinsonism effect (eg, Neck stiffness and ↑ muscle rigidity).</p> <p>If the patient is already with a history of Parkinson's disease (on co-careldopa), metoclopramide can worsen the muscle stiffness and rigidity.</p> <p>Rx → Procyclidine (anticholinergic: It can ↓ the effects of the cholinergic excess that resulted from dopamine deficiency caused by metoclopramide).</p>
Key 8	<p style="text-align: center;">Important Pharmacology Collection:</p> <p>■ Muscle Spasm → Baclofen (1st line)</p> <ul style="list-style-type: none"> • Baclofen is a skeletal muscle relaxant that can be used in muscle spasms that might occur in multiple sclerosis, cerebral palsy, spinal cord injury or after stroke or as an adjuvant with radiotherapy in bone metastasis.

Other useful medications to know → **Botulinum toxin** (= **botox**), **Diazepam**.

■ Drug-induced parkinsonism (eg, tremors, **neck stiffness and ↑ muscle rigidity**). Example of drugs that can cause parkinsonism: **metoclopramide**, **aripiprazole**.

Rx of drug-induced parkinsonism → **Procyclidine**. (Anticholinergic).

(**Procyclidine** is an anticholinergic: It can ↓ the effects of the cholinergic excess that resulted from dopamine deficiency caused by metoclopramide).

■ **Neuropathic pain** “Shooting, electric shock like, Burning, Paraesthesia”
→ **Amitriptyline** (1st preferred) or **Gabapentin** or **Duloxetine** or **Pregabalin**.

Away Goes D neuropathic Pain

■ **Trigeminal neuralgia** → **Carbamazepine = Anticonvulsants**.

■ **Bone pain due to bone metastasis:**

First line → **Radiotherapy**. If fails to control pain:

Second line → **Bisphosphonate e.g. (Alendronate, Risedronate)** + **NSAIDs**.

If there is some remaining muscle spasms, **ADD baclofen** as an adjuvant.

Key
9 **2 Important Side effects of Calcium Channel Blockers (e.g. Diltiazem) to be remembered:**

■ **Ankle Swelling**

☐ **Gingival Hyperplasia**

So, for one who take CCB such as ***diltiazem, amlodipine, verapamil, nifedipine***, he might get **swelling of his → Ankle/ Gingiva.**

Key
10

☐ An alcoholic wants to quit drinking, what should be given to **reduce his withdrawal symptoms?**

✓ Note that the question asks about the drug that would alleviate the “withdrawal symptoms”. In this case, it would be

→ **Chlordiazepoxide.**

✓ If the question asks about a drug that would prevent Craving, the answer would be → Acamprosate.

✓ If the question asks about a drug that would act as a deterrent (abstinence), the answer would be → Disulfiram.

✓ If he develops hallucination, seizure (delirium tremens) → Lorazepam

In summary: (Commonly asked)

✓ Acute alcohol withdrawal: sweating, tremors, altered mentation, ± Hallucination
 → **Chlordiazepoxide "First"** + **Thiamine (Vit. B1)**

✓ If with "seizure" → **IV Lorazepam**. Or **Diazepam** "If IV Lorazepam is not in the options)

✓ Wernicke's encephalopathy (**CAS: Confusion, Ataxia, Squint**: ophthalmoplegia, Nystagmus, diplopia), may present 12-24 hours after stopping alcohol as well.

→ **IV Vitamin B1** (**Thiamine**) (**IV Pabrinex**) or (**High potency Vitamin B Complex**).

✓ An alcoholic wants a medication to serve as a **Deterrent** when he takes alcohol "Abstinence" → **Disulfiram**.

✓ An alcoholic wants a medication to reduce his **Craving** for alcohol → **Acamprosate**

✓ An alcoholic wants a medication to reduce withdrawal symptoms
 → **Chlordiazepoxide**

Key 11 ■ Opioid (e.g. Heroin) overdose → give **Naloxone**.

■ Opioid (e.g. Heroin) wants to quit opiate, the drug that helps him combat withdrawal symptoms → **Methadone**

Methadone is the Method number 1 for (detoxification); reducing withdrawal symptoms in opioid addicts.

Key 12	<p>■ Beta-blockers (e.g. Atenolol) important side effect → Bronchoconstriction.</p> <p>■ Beta-Agonist (e.g. Salbutamol) important side effect → Tachycardia.</p> <p>Example, A29 YO patient presents to the ED with tachycardia, palpitations and chest pain. She is an asthmatic and her GP has recently changed her medication.</p> <p>→ Review her medication (she is asthmatic and salbutamol which is a short-acting-beta2 agonist is known to cause Tachycardia).</p>
Key 13	<p>✓ Remember that CRAP-GPs (The most important ones: Carbamazepine, Rifampin, Alcohol “chronic”, Phenytoin, Phenobarbital) if given in a patient taking Combined Oral Contraceptive pills, they would decrease the efficacy of COCP. Therefore,</p> <p>→ advise patient to use alternative method for contraception such as barriers.</p> <p>✓ If other drugs such as clarithromycin/ azithromycin/ Amoxicillin are given with COCP → No change to contraceptive methods.</p> <p>○ Also, remember that enzyme INDUCERS → DECREASES (↓) INR</p> <p>○ While, enzyme INHIBITORS → INCREASES (↑) INR</p>

P450 Enzyme Inducers (CRAP GPs)	P450 Enzyme Inhibitors (SICK-FACES.COM)
Decreases Warfarin effect → ↓ INR	Increases Warfarin effect → ↑ INR
If used with COCP, an additional contraceptive method is needed (e.g. Depo-Provera, IUS, barrier methods) as these enzyme inducers weaken the COCP and POP.	If used with COCP, no need to change anything.
<ul style="list-style-type: none"> • Carbamazepine • Rifampin • Alcohol “Chronic” • Phenytoin • Griseofulvin • Phenobarbital • Sulphonylureas 	<ul style="list-style-type: none"> • Sodium Valproate. • Isoniazid. • Cimetidine. • Ketoconazole. • Fluconazole. • Alcohol (Acute drinking). • Chloramphenicol. • Erythromycin (Macrolides: Clarithromycin, Azithromycin) • Sulfonamides. • Ciprofloxacin.

- Omeprazole.
- Metronidazole

Remember, if a pregnant woman is taking sodium valproate, she needs to take 5 mg folic acid daily until the 12th week of gestation.

Example 1,

An elderly ♀ presents with chest infection and thus was started on clarithromycin. Her Hx includes, taking Carbamazepine for trigeminal neuralgia, taking Warfarin for mechanical valve replacement, taking Bisoprolol, Amlodipine and Atorvastatin. Her INR was found to be 1.4 (The target for mechanical valve replacement is 3-4). What is the causative drug for this low INR?

The answer → Carbamazepine

■ Carbamazepine is P450 enzyme inducer; thus, it will decrease the anticoagulant effect of Warfarin and therefore leads to low INR.

Example 2,

An elderly ♀ presents with chest infection and thus was started on clarithromycin. Her Hx includes, taking Carbamazepine for trigeminal neuralgia, taking Warfarin for mechanical valve replacement, taking Bisoprolol, Amlodipine and Atorvastatin. Her INR was found to be **5.9** (The target for mechanical valve replacement is 3-4). What is the causative drug for this **HIGH** INR?

The answer → **Clarithromycin**

Clarithromycin is a Macrolide (like erythromycin), it is P450 enzyme **inhibitor** and thus leads to **increase** the anticoagulant effect of Warfarin and therefore **high INR**.

Example 3,

A lady on COCP has been prescribed doxycycline to manage Lyme disease. What should be done regarding her contraception?

→ **Continue COCP with no additional contraceptive methods.**

Doxycycline is **not** hepatic enzyme **inducer**; thus, the effectiveness of COCP will remain the same. Hence, **no change is required**.

Example 4,

A lady on COCP has been prescribed Anti-TB medications. What should be done regarding her contraception?

→ **Consider alternative/ additional or changing contraceptive method to e.g. barrier, Mirena, Depo-Provera.**

✓ **Remember, Rifampin** (which is one of the hepatic enzyme **inducers**) is one of the Anti-TB medications that she is going to receive.

✓ Hepatic enzyme inducers (e.g. Rifampin, Carbamazepine, Phenytoin...) **weaken** the effectiveness of the COCP and POP. Therefore, other contraceptive method is required!

✓ Note that even after finishing the course of hepatic enzyme inducers, a female would still need to continue using the safe contraceptive method for additional 4-8 weeks.

☐ **Remember**, the four Anti-TB drugs are the same in pregnancy.

✓ (RIPE) → Rifampicin, Isoniazid, Pyrazinamide, Ethambutol

✓ These are **not**-contraindicated during pregnancy.

☐ **Remember**,

Streptomycin should be avoided during pregnancy (Harmful to fetus)

Example 5,

A lady on COCP has been prescribed amoxicillin for an acute episode of otitis media. What should be done regarding her contraception?

→ **No additional precaution is needed.**

Amoxicillin is **not** a hepatic enzyme **inducer**; thus, the effectiveness of COCP will remain the same. Hence, **no change is required**.

Example 6,

An 18 YO lady wants contraception as she is sexually active. She does not want to use barrier methods. Her menstrual cycles are regular (28 day) that last for 4 days. She has epilepsy and uses carbamazepine. She does not smoke and has no history of venous thromboembolism. Of the following, which is the most appropriate contraceptive to use?

- A) COCP.
- B) POP.
- C) Levonorgestrel IUS.
- D) IU copper device.
- E) Depot medroxyprogesterone acetate.

✓ As she is < 20 YO → levonorgestrel IUS and IU copper device are UKMEC 2 (UKMEC 2 = the benefits outweigh the risk. So, if there is an option with UKMEC 1, it is better to be used. However, if there is no UKMEC 1, we may use UKMEC 2).

✓ She uses carbamazepine “enzyme inducer” which decreases the efficacy of COCP, POP and implant. Thus, these are not suitable.

✓ The remaining option is → **Depot medroxyprogesterone acetate** (DMPA injection). It is UKMEC 1 for 18 YO.

Example 7,

An 18 YO lady wants contraception as she is sexually active. She does not want to use barrier methods. Her menstrual cycles are Irregular that last for 8 days. She has epilepsy and uses carbamazepine. She does not smoke and has no history of venous thromboembolism. She has migraine with aura. Of the following, which is the most appropriate contraceptive to use?

- A) COCP.
- B) POP.
- C) Levonorgestrel IUS.
- D) IU copper device.
- E) Progesterone-only implants.

✓ She uses carbamazepine “enzyme inducer” which decreases the efficacy of COCP, POP and implant. Thus, these are not suitable. So, options (A, B and E are wrong). Additionally, migraine with aura contraindicates the use of COCPs.

✓ We are left with Levonorgestrel IUS and IU copper device. Both are UKMEC 2 in females < 20 YO. However, we may still use them if no other option with UKMEC 1 is suitable. In this case, since she has irregular menstruation with

prolonged menstrual bleedings, levonorgestrel IUS (e.g. Mirena, Levosert, Jaydess) is better than IU copper device.

✓ So the answer is → **Levonorgestrel IUS**.

Key 14 ■ The anti-emetic (**Metoclopramide**) can cross blood brain barrier and thus cause **parkinsonian symptoms (eg, muscle rigidity, neck stiffness, tremors)**.

To manage → anticholinergics (eg, **procyclidine**).

Note,

Parkinsonian symptoms → Parkinson disease features → Bradykinesia “slow movements” + Resting tremors + **Rigidity** + Postural instability “Ataxia”)

Example,

A lung cancer patient with shoulder pain has been shifted from oral morphine to fentanyl patch due to nausea caused by oral morphine. He was also given metoclopramide for nausea and vomiting. A few hours later, **his neck has become weak and stiff**. What is the reason for these new symptoms?

→ **Side Effect of Metoclopramide treatment**.

■ **Important Side Effects of Metoclopramide:**

- ✓ **Extrapyramidal effects** → dystonia, akathisia, parkinsonism, bradykinesia, tremors.
- ✓ **Neuroleptic malignant syndrome** → high fever, sweating, tachycardia, agitation, confusion, **muscle rigidity**, **neck stiffness**.

Key
15

Steps of Management of Asthma

- **Step (1): Inhaled SABA** (Short-acting beta-2 agonist e.g. **inhaled salbutamol**)
If asthma is not controlled (a patient uses inhaled salbutamol > 3 doses/ week) → Step 2
- **Step (2): Inhaled SABA + Inhaled Corticosteroids** (e.g. **inhaled beclomethasone**)
- **Step (3): Inhaled SABA + Inhaled Corticosteroids + LTRA** (**leukotriene receptor antagonist**).
- **Step (4): SABA + Inhaled Corticosteroids + LABA ± LTRA**
LABA = Long-acting beta agonists e.g. **Salmeterol**.

Asthma management in short (Nice Guidelines)

- 1) **SABA**
- 2) **SABA + Inhaled Corticosteroids**
- 3) **SABA + Inhaled Corticosteroids + LTRA (Montelukast)**
- 4) **SABA + Inhaled Corticosteroids + LABA (e.g., Salmeterol) ± LTRA**

The rest of the steps are not as important; however, study them in case:

- 5) **SABA** + Maintenance and reliever therapy (**MART**) “**low-dose** inhaled corticosteroids (ICS)” ± **LTRA**
- 6) **SABA** + Maintenance and reliever therapy (**MART**) “**moderate-dose** inhaled corticosteroids (ICS)” ± **LTRA**
- 7) **SABA ± LTRA** (+) **One of the following:**
 - *Further increase the dose of inhaled corticosteroids* (or)
 - *Trial of a new drug* (e.g. *theophylline*) (or)
 - *Seek professional advice*

Asthma management in short (BTS Guidelines)

- 1) **SABA**
- 2) **SABA + Inhaled Corticosteroids**
- 3) **SABA + Inhaled Corticosteroids + LABA (e.g., Salmeterol) ± LTRA**
- 4) **SABA + Inhaled Corticosteroids + LTRA (Montelukast)**

So, be careful, the **third step** in NICE guidelines is **LTRA** “e.g., **Montelukast**” while the **third step** in (BTS guidelines is **LABA** “e.g., **Salmeterol**”.

The question may include the guidelines. “[recently asked 2021 ✓](#)”

Notes:

- **SABA** → **inhaled salbutamol**
- **Inhaled corticosteroid** → **Inhaled beclomethasone**
- **LTRA** → **Leukotriene receptor antagonist**
- **LABA** → **Inhaled Salmeterol**

Key
16

Dry [Non-Productive] Cough can be a side effect of:

✓ **ACE inhibitors** (eg, Ramipril, Lisinopril, Enalapril, Captopril).

And

✓ **Methotrexate**

☐ Why Dry Cough with Methotrexate?

○ Prolonged intake of **methotrexate** (such as in patients with Rheumatoid Arthritis) can rarely lead to a severe condition → **Pulmonary Fibrosis**.

○ **Pulmonary Fibrosis** → **Dry cough, breathlessness, wheezes.**

Diffuse bilateral interstitial infiltrates on Chest X-ray may also be seen.

So, **methotrexate** is **anti-folic acid** (teratogenic)

+ it can cause **dry cough**.

Do you remember another anti-folate medication?

→ Trimethoprim (so, it is contraindicated in the first trimester of pregnancy).

Key 17 **Post-operative** intractable **Nausea** and **Vomiting**:

Give → **IV Ondansetron**

Key 18 **Very Important: Anti-emetics for Nausea and Vomiting**

☐ Anti-emetic in renal failure/ Hypercalcemia (metabolic cause) or Drug or Toxin induced vomiting

→ **Haloperidol**. (1st line)

☐ However, if there is associated **Parkinson's disease**, Haloperidol is contraindicated! Instead of Haloperidol, we use instead:

→ **Cyclizine**, or: domperidone or ondansetron (buy not in elderly).

If vomiting persists in Parkinson's disease → Levomepromazine. (2nd line)

(Never use Haloperidol with Parkinson's)!

■ Anti-emetic due to ↑ ICP (eg, intracerebral tumour) or vomiting due to bowel obstruction

→ **Cyclizine.**

■ Anti-emetic in vomiting due to Chemotherapy, Radiotherapy, Post-op

→ **Ondansetron.**

■ Anti-emetics in Hyperemesis gravidarum

✓ **1st line:** “zine” family eg, **Cyclizine, Promethazine**

✓ **2nd line:** IV **Metoclopramide, Ondansetron**

✓ **3rd line:** Steroids

■ Vertigo (eg, Meniere’s/ BPPV/ Vestibular neuritis)

→ **Buccal Prochlorperazine.**

■ Anti-emetic for post-operative intractable Nausea and Vomiting

→ **IV Ondansetron**

Key 19	<p>■ In any patient on Warfarin, the most important symptom that he needs to urgently report is</p> <p>→ HEADACHE</p> <p><i>(This is because people on warfarin are liable to subdural hematoma which presents with headache and other features)</i></p> <p>■ In any patient on Bisphosphonates, the most important symptom that he needs to be urgently reported is</p> <p>→ Severe, sudden Heartburn or Chest pain (either is correct)</p>
Key 20	<ul style="list-style-type: none"> Remember that ACE inhibitors (e.g. ramipril, enalapril) and Potassium sparing diuretics (e.g. Spironolactone) can cause <p>→ hypeRkalemia.</p>
Key 21	<ul style="list-style-type: none"> Remember that Loop Diuretics (e.g. Furosemide) and Thiazide like diuretics (e.g. Bendroflumethiazide) can cause <p>→ hypOkalemia and Gout</p>
Key 22	<p>When using macrolides (eg, Clarithromycin, Erythromycin)</p> <p>→ STOP Statins (eg, Atorvastatin, Simvastatin)!</p>

In other words,

Concomitant use of macrolides + statins is Contraindicated!

Key
23

Mechanism of Action of:

☐ Tranexamic Acid (for menorrhagia)

→ **Inhibits fibrinolysis**

☐ N-Acetylcysteine (for paracetamol overdose)

→ **Protection from free radicals.**

☐ Low Molecular Weight Heparin (LMWH)

→ **Inhibits the conversion of prothrombin to thrombin** (activate the antithrombin) “the same initial mechanism for unfractionated heparin as well”.

☐ **Copper** IUD as an Emergency Contraception “after unprotected sex”

→ **inhibits Implantation** (inhibits fertilisation).

☐ **Oral** Progesterone-only emergency contraceptive **Pills** – Levonorgestrel

→ **inhibits Ovulation**

■ Ulipristal acetate (EllaOne)

→ **inhibits or delays Ovulation**

Key
24

Calculation of Units of Alcohol

Strength ABV (in %) X Volume (in ml) ÷ 1000 = ... Units

○ **Beer:**

✓ 1 pint of beer (3.5%) = 2 Units.

✓ 1 pint of premium beer (5-6%) = 3 Units.

○ **Wine:**

✓ Small glass 125 ml = 1.5 unit

✓ Medium glass 175 ml = 2 units

✓ Large glass 250 ml = 3 unit

○ **Cider:** 1 pint of cider = 3 units.

Example,

A man drinks half a litre of vodka (ABV 40%) and a pint of beer (3.5%) a week.

40% X 500 ml ÷ 1000 = 20 Units

+

1 pint of 3.5% beer = 2 Units

So, he drinks **22 units** a week.

UK guidelines recommend that a person should drink

- **No more than 14 units a week,**
- **No more than 3 units a day,**
- **with at least 2 alcohol-free days a week.**

Key
25

Important Side Effects

☐ **Calcium Channel Blocker** (e.g. Diltiazem, Verapamil, Amlodipine)

→ **Ankle Swelling, Gingival Hyperplasia.**

☐ **Beta-blockers** (e.g. Atenolol)

→ **Bronchoconstriction** (Wheezes, SOB, heavy chest...).

■ **Beta-Agonist** (e.g. Salbutamol)

→ Tachycardia/ Palpitations/ Muscle twitching and tremors/ Shaky hands.

■ **ACE inhibitors** (eg, lisinopril, enalapril)

→ Dry cough (Give ARBs eg, **Losartan** instead -important-), Hyperkalemia.

■ **Diuretics**

✓ **Loop (furosemide)**

→ Hyponatremia, Hypokalemia, Gout (hyperuricemia).

✓ **Thiazide (bendroflumethiazide)**

→ Hyponatremia, Hypokalemia, Gout, Postural hypotension, Hyperglycemia

✓ **Potassium sparing (spironolactone)**

→ Hyponatremia, Hyperkalemia, Gynecomastia.

■ **Metoclopramide**

✓ **Extrapyramidal effects** → dystonia, akathisia, parkinsonism, bradykinesia, tremors.

✓ **Neuroleptic malignant syndrome** → high fever, sweating, tachycardia, agitation, confusion, **muscle rigidity**, **neck stiffness**.

☐ **Haloperidol** → Sexual Dysfunction + Gynecomastia.

☐ **Fluoxetine (SSRI)** → Anorgasmia (delayed ejaculation). Other: hyponatremia

So, in a man who has erection but no or delayed ejaculation → Fluoxetine

☐ **Citalopram** → Acute closure angle glaucoma

→ urgent ophthalmology referral.

Key
26

Neuroleptic Malignant Syndrome

♠ Neuroleptic malignant syndrome is a rare but dangerous condition seen in patients taking antipsychotic medication.

♠ **Some causing drugs:**

✓ **Haloperidol** (Typical Antipsychotic).

✓ **Metoclopramide** (Antiemetic, dopamine antagonist, cross blood-brain-barrier).

♠ **Features**

✓ Onset usually in first weeks of treatment or after increasing dose

- ✓ **Pyrexia (fever)**
- ✓ **Agitation**
- ✓ **Confusion/ altered consciousness**
- ✓ **Muscle rigidity** (e.g. **neck stiffness**)
- ✓ **Tachycardia**
- ✓ **Sweating**

A raised creatine kinase is present in most cases. Acute kidney injury (secondary to rhabdomyolysis) may develop in severe cases. A leucocytosis may also be seen.

♠ **Management**

- Stop antipsychotic
- Rapid cooling
- IV fluids to prevent renal failure
- **Dantrolene** “post-synaptic muscle relaxant used in NMS”
- **Dopaminergic** agent such as **bromocriptine**

NOTES

- ◆ Do not use Metoclopramide in nauseous patients with Parkinson's.
- ◆ Do not use Haloperidol in psychotic patients with Parkinson's (use lamotrigine).

So, in Parkinson's, do not give haloperidol nor metoclopramide.

Key
27

Calculating dose in pediatrics

Example (1),

10-month-old child who weighs 10 kg has been prescribed trimethoprim for UTI at a dose of 4 mg/kg twice a day. The preparation of trimethoprim is 50mg/5ml. What is the dose to be given to this child?

weight 10 kg
dose 4 mg/kg
 $\Rightarrow 4 \times 10 = \underline{40 \text{ mg}}$

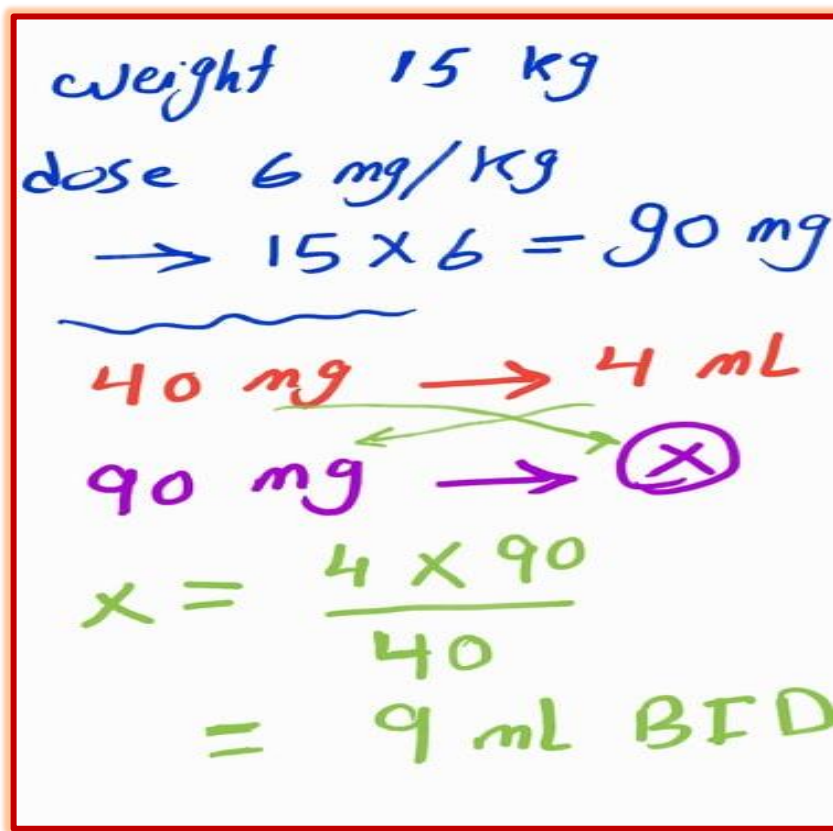
50 mg $\xrightarrow{\text{red arrow}}$ 5 mL
40 mg $\xrightarrow{\text{purple arrow}}$ X mL

$$X = \frac{5 \times 40}{50}$$
$$= 4 \text{ mL}$$

So, the answer \rightarrow **4 ml BD**

Example (2),

18-month-old child who weighs 15 kg has been prescribed trimethoprim for UTI at a dose of 6 mg/kg twice a day. The preparation of trimethoprim is 40mg/4ml. What is the dose to be given to this child?



Handwritten calculation for trimethoprim dose:

weight 15 kg
dose 6 mg/kg
 $\rightarrow 15 \times 6 = 90 \text{ mg}$

40 mg \rightarrow 4 mL
90 mg \rightarrow (X)

$x = \frac{4 \times 90}{40}$
 $= 9 \text{ mL BID}$

So, the answer \rightarrow **9 ml BD**

Key
28

Polypharmacy

	<ul style="list-style-type: none"> ✓ An old patient (usually > 60 YO) ✓ Takes ≥ 5 Medications ✓ Presents with dizziness, confusion, Frequent Falls (± Hx of feeling dizzy a few moments before a fall). ✓ Due to postural hypotension (caused by multiple drug intake especially anti-hypertensives and anti-cholinergics).
Key 29	<p>A patient on ramipril and bendroflumethiazide was found to have serum potassium of 5.9 (high) and serum sodium of 128 (low).</p> <p><i>In this case,</i></p> <ul style="list-style-type: none"> ○ The Thiazide like diuretics (bendroflumethiazide) has caused → hyponatremia. ○ The ACE inhibitor (ramipril) has caused → Hyperkalemia.
Key 30	<p>Lithium</p> <ul style="list-style-type: none"> ✓ For Bipolar Disorder.

☐ **Before commencing it, do the following tests: “important”**

- **Renal Function Tests.**
- **Liver Function Tests.**
- **Thyroid Function Tests.**
- **Baseline ECG.**
- **Others:** Pulse, BP, Pregnancy Test, Parathyroid hormone, FBC, U&E, Ca, Mg.

☐ If **lithium toxicity** developed (eg, blurry vision, tinnitus = ringing ears, dizziness, lethargy, muscle weakness, diarrhea, vomiting)

→ **Stop lithium and repeat serum lithium level every 6-12 hours** + Supportive care (There is no antidote to lithium toxicity).

When toxicity resolves, lithium can be restarted at a lower dose (Never stop lithium suddenly; it has to be over a period of 3 months to prevent relapse).

Key
31

When can we use fentanyl patches for pain control in cancer patients?

If the oral route is not tolerated + the pain is **STABLE** at the shifting time

Example,

A patient with nasopharyngeal cancer is being pain controlled on oral morphine that **manages his pain well**. However, he now has difficulty in swallowing his morphine tablets. What should be done?

→ **Replace oral morphine with transdermal fentanyl patch.**

(In this scenario, the pain is already stable “controlled”. Thus, shifting to a fentanyl patch is appropriate).

If fentanyl patch was not among the options, pick Subcutaneous morphine.

When **not** to use Fentanyl patch even in stable pain?

Example

A terminal bladder cancer patient has lower abdominal pain that is **well controlled** with Oral Codeine Phosphate. However, he is nauseous, and finds it difficult to keep taking oral medications as he is weak to swallow. What should be done?

■ **Oral codeine can be replaced by either**

✓ **Buprenorphine patch** (best option if given), or

✓ **Subcutaneous Morphine.**

- Note that he cannot tolerate orally, thus any oral option is **WRONG!**
- Also, Fentanyl patch is inappropriate as it is very potent compared to his current method of pain control (codeine). It will be an unnecessary exposure to more opioids (Overdose).
- Finally, there is no Subcutaneous form of Codeine!

So, in controlled pain (stable pain)

- Change from **oral morphine** to → **Fentanyl patch**.
- Change from **oral codeine** to → **Buprenorphine patch** OR **SC morphine**.

If the pain is **not controlled, never shift to Fentanyl Patch!**

This is because fentanyl patch needs 12-24 hours to achieve its therapeutic level (long half-life). During this period, the patient will remain in pain! We need something faster!

Example

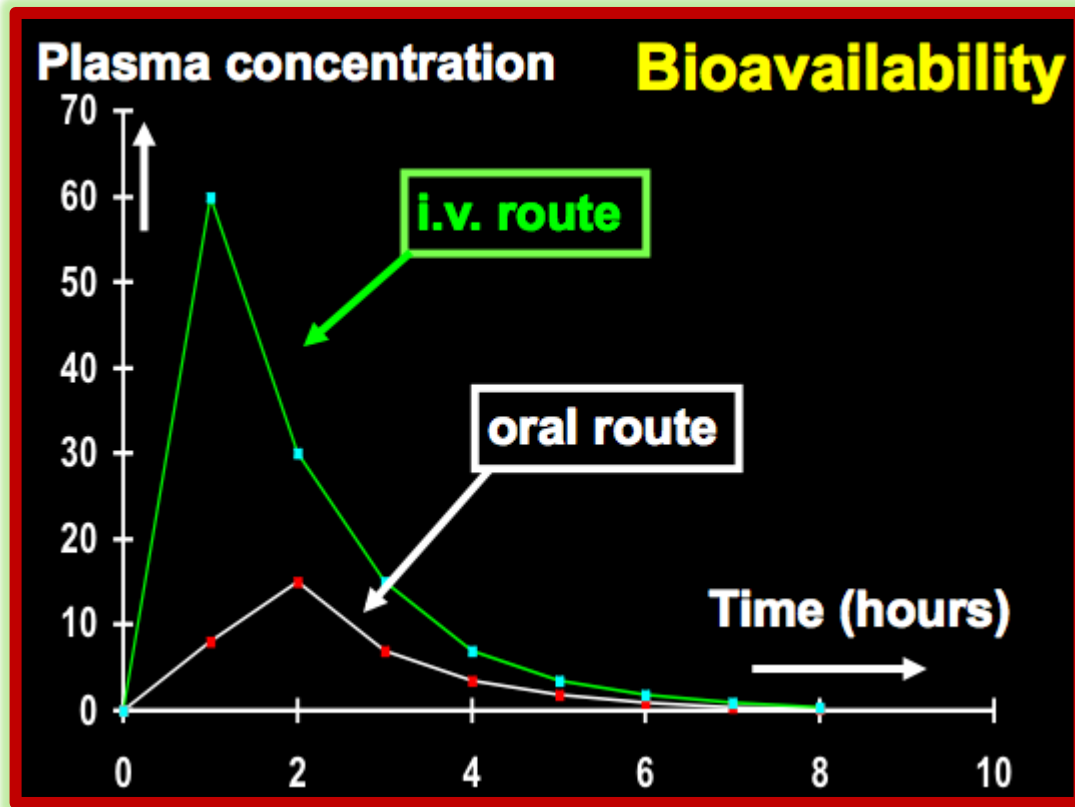
After an anterior resection of rectum, the pain was controlled with oral oxycodone. Now, the pain is not controlled and the patient has started to vomit and cannot tolerate orally.

→ **Shift to IV morphine**

- ✓ Fentanyl patch is not suitable as the pain is not well controlled.
- ✓ Any oral analgesic is not suitable as he cannot tolerate orally.

Key 32	<p>An elderly with Parkinson's disease has developed an episode of acute psychosis and become aggressive. He punches everyone approaching him in the face.</p> <p>The most appropriate immediate Rx → Lorazepam (for rapid tranquilization)</p> <ul style="list-style-type: none">• Lorazepam is a rapid acting benzodiazepine. (Could be given IM here).• Haloperidol (Typical Anti-psychotic) is contraindicated in Parkinson's disease patients.• Olanzapine and Risperidone (Atypical Antipsychotics) can exacerbate Parkinson's disease. <p>Note, if the aggressive/ distressed patient has no Dementia, Alzheimer's, or Parkinson's → we could consider Haloperidol or Olanzapine as a short-term therapy if non-pharmacological (de-escalation) techniques have failed.</p>
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Key
33



▣ Plasma concentration of a drug peaks much faster for IV route than oral route. Why?

→ **Hepatic First Pass Elimination**

✓ **IV drug** goes directly to the systemic circulation “blood” i.e. it does not go to liver for metabolism which takes time and reduces the drug bioavailability.

✓ On the other hand, **oral drug** goes to gut, then via the portal system to the liver where it is metabolised and its bioavailability is reduced (takes time).

Key
34

▣ Features suggesting **DVT** “Deep Vein Thrombosis (e.g. **pain/ swelling of calf muscles**)

	Start → Low molecular weight heparin LMWH (enoxaparin) until DVT is ruled out!
Key 35	<p>In Diabetic Neuropathy:</p> <p>Neuropathic pain can present in any form of the following:</p> <p>(Burning), (Tingling), (Numbness), (Itching), (Paraesthesia), (Shooting/ Stabbing)</p> <p>Example, a diabetic patient with ankle ulcer with agonising Burning Pain.</p> <p>Rx? → Amitriptyline (1st line) or Gabapentin or Duloxetine or Pregabalin.</p> <p><i>Away Goes D neuropathic Pain</i></p> <p>(+) Good glycemic control.</p>
Key 36	<p>Another example on Neuropathic pain:</p> <p>A 46 YO man has undergone a surgery to remove mandibular cancer presents with perioral paraesthesia and severe perioral pain that is not relieved by oral morphine and oral ibuprofen. The skin is very tender to touch.</p>

	<p>Rx → Amitriptyline (1st line) or Gabapentin or Duloxetine or Pregabalin</p> <p>This is likely a neuropathic pain due to nerve injury during the operation.</p>
Key 37	<p>Another example on Neuropathic pain:</p> <p>An elderly with terminal prostate cancer with his pain is being controlled with fentanyl patch. A few weeks ago, he develops shooting pain radiating down both his arms to his hands. He describes it as a stabbing pain.</p> <p>Rx → Amitriptyline (1st line) or Gabapentin or Duloxetine or Pregabalin</p>
Key 38	<p>Doxycycline and many other medications can cause nausea and vomiting if they were taken orally on an empty stomach. Thus, a simple advice to the patient</p> <p>→ to take the medication with meals (not before meals) might prevent nausea.</p>
Key 39	<p>A 42 YO man weighs 80 kg presents for a procedure. He was given 20 ml of 1% lidocaine without epinephrine prior to the procedure. If the maximum allowed dose is 4 mg/kg, how much of 1% lidocaine can be given to him?</p> <p>1% → 10mg/ml (constant)</p>

Max dose: 4mg/kg. He is 80 kg.

So, $4 \times 80 = 320 \text{ mg}$ (max dose)

10 mg -----→ 1 ml

320 mg -----→ (X) ml

(X) = $(320 \times 1) \div 10 = 32 \text{ ml}$

He was already given 20.

So, the remaining dose = $32 - 20 = 12 \text{ ml}$

Key 40 Example, A29 YO patient presents to the ED with tachycardia, palpitation and chest pain. She is an asthmatic and her GP has recently changed her medication.

→ **Review her medication** (she is asthmatic and beta-agonists are known to cause Tachycardia).

Key 41	<p>Remember,</p> <ul style="list-style-type: none"> ■ Beta-Agonists (e.g. Salbutamol, Salmeterol) which are used for Asthma management can cause Tachycardia and Palpitation, ■ whereas Beta-blockers (e.g. Atenolol, Propranolol) which are used for rate-control can worsen Asthma by causing bronchoconstriction!
Key 42	<p>A 50 YO post-op patient has his pain controlled with oral morphine 60 mg BD. However, he is now unable to tolerate oral medication, what should be done?</p> <p>Shift to continuous Subcutaneous morphine infusion.</p> <p>What will be the dose??</p> <p>Let's analyse it:</p> <p>✓ The patient is pain-controlled on 60 mg BD oral morphine (twice a day), this means 120 mg in 24 hours.</p>

When shifting from Oral morphine to SC morphine $\rightarrow (\div 2)$.

So, he would need **$(120 \div 2) = 60$ mg SC morphine in 24 hours**

Therefore, the final Answer:

Commence morphine 60 mg per 24 hours by continuous Subcutaneous infusion.

Remember:

When replacing one analgesic with another, the dose should be modified as follows:

☐ From [Oral morphine to Subcutaneous morphine] $\rightarrow (\div 2)$

☐ From [Oral morphine to Subcutaneous diamorphine] $\rightarrow (\div 3)$

☐ From [Oral tramadol to IV morphine] $\rightarrow (\div 20)$

Key
43

A prostate cancer patient was pain-controlled on 600 mg oral tramadol hydrochloride a day. He now cannot tolerate oral medications and therefore, the doctors have decided to shift him to IV

morphine to be given in hospital. What should be the dose of IV morphine?

From [Oral tramadol to IV morphine] $\rightarrow (\div 20)$

So, $600 \div 20 = 30$

The answer is \rightarrow **30 mg**.

When shifting from Oral Tramadol to IV morphine $\rightarrow (\div 20)$.

Key
44 **Selective serotonin reuptake inhibitors (SSRIs).**

- Selective serotonin reuptake inhibitors (SSRIs) are considered first-line treatment for the majority of patients with **depression**.
- **Citalopram** and **fluoxetine** are currently the preferred SSRIs.
- **Sertraline** is useful post myocardial infarction as there is more evidence for its safe use in this situation than other antidepressants.

■ SSRIs should be used with caution in children and adolescents. **Fluoxetine** is the drug of choice when an antidepressant is indicated.

✓ **Gastrointestinal symptoms** are the **most common side-effect**.

✓ There is an increased risk of gastrointestinal bleeding in patients taking SSRIs.

✓ A proton pump inhibitor should be prescribed if a patient is also taking a NSAID.

■ Avoid concomitant use of SSRI with: NSAIDs/ Aspirin/ Warfarin/ Triptans.

■ **IMPORTANT:**

SSRIs can take 2-4 weeks before antidepressant effect can be seen

✓ if no response after 2-4 weeks → **Check patient's adherence (compliance)**.

✓ if no response after 4 weeks + the patient is compliant

→ **either ↑ dose or switch antidepressant.**

Example,

A 33 YO man has depression and has been recently started on sertraline (a SSRI). When can a therapeutic effect be seen?

1-2 hours ■ 1-2 day ■ **1-2 weeks** ■ 1-2 months

The closer answer to 2-4 weeks.

☑ **Some Side effects:**

✓ Haloperidol → Sexual Dysfunction + Gynecomastia.

✓ Fluoxetine (SSRI) → Anorgasmia (delayed ejaculation).

Other: SIADH “hyponatremia”

So, in a man who has erection but no or delayed ejaculation

*The causative drug is → **Fluoxetine***

For Reading:

✓ Following the initiation of antidepressant therapy patients should normally be reviewed by a doctor after 2 weeks. For patients under the age of 30 years or at increased risk of suicide they should be reviewed after 1 week. If a patient makes a good response to antidepressant therapy, they should continue on treatment for at least 6 months after remission as this reduces the risk of relapse.

✓ When stopping a SSRI, the dose should be gradually reduced over a 4-week period (this is not necessary with fluoxetine). Paroxetine has a higher incidence of discontinuation symptoms.

✓ **Discontinuation symptoms:**

increased mood change, restlessness, difficulty sleeping, unsteadiness, sweating, gastrointestinal symptoms: pain, cramping, diarrhoea, vomiting, paraesthesia

Key
45



Red circular itchy rash → Likely **fungal** infection

“ringworm infection = **dermatophytosis**”

Give → **Clotrimazole cream**

(Note, Fusidic acid “Fucidin cream” is antibacterial and thus not suitable for fungi)

Key
46

A 30 YO asthmatic patient on 3 inhaled medications for her asthma. 2 of which are regular and one is when needed. She now complains of twitching and tremors of her hand hands. What is the Culprit medication?

✓ **The 2 regular inhalers are** → LABA (Salmeterol) and Inhaled Beclomethasone.

✓ **The 1 as needed inhaler is** → SABA (Salbutamol).

The most likely one that has caused tremors is → **Salbutamol inhaler**

Remember that salbutamol (short acting beta agonist) and salmeterol (long acting beta agonist) have the same side effects but **salbutamol being used as needed means that it can be overused and thus is more likely to cause side effects.**

Remember, side effects of:

■ **Beta-Agonist** (e.g. Salbutamol)

→ Tachycardia/ Palpitations/ Muscle twitching and tremors.

Key 47 ■ Heroin overdose → give **Naloxone**.

■ Heroin detoxification (against withdrawal symptoms) → give **Methadone**

Key 48 **Heroin withdrawal features:**

Think of it as it is your girlfriend :D 😊

Your (heroin) leaves you “Withdrawal”:

- You cry a lot → **Watery eyes** and **runny nose**.
- You cannot sleep → **Insomnia**.
- You miss her → **Agitation**.

Drug Withdrawal Features

Heroin	<ul style="list-style-type: none"> - Withdrawal begins 12 hours after last dose - Peaks at 24-48 hours - Increased body secretions: <i>sweating</i>, diarrhea, runny nose, tearing (Flue-like symptoms esp. early in withdrawal) + - Pain: <i>Abdominal pain</i>, joints (<i>arthralgia</i>), muscle aches. + - Others: <i>agitation</i>, insomnia, anxiety (common in other drugs)
Benzo-diazepines	<ul style="list-style-type: none"> - Withdrawal begins 1-4 days and peaks at 2 weeks. - Panic attacks + Other common (agitation, insomnia, anxiety) <p>Remember: benzodiazepines are used to treat panic attacks and anxiety.</p>
Cocaine	<ul style="list-style-type: none"> - Within hours of last dose and peaks in a few days. - Depression, irritability, muscle aches + Others (insomnia ...)

Alcohol	<p>symptoms start at 6-12 hours: tremor, sweating, tachycardia, anxiety.</p> <p>peak incidence of seizures at 36 hours</p> <p>peak incidence of delirium tremens is at 48-72 hours:</p> <p><u>coarse tremor, confusion, delusions, auditory and visual hallucinations, fever, tachycardia</u></p> <p>Management</p> <ul style="list-style-type: none"> • first line: benzodiazepines e.g. chlordiazepoxide. • Lorazepam may be preferable in patients with hepatic failure. Typically given as part of a reducing dose protocol • carbamazepine is also effective in treatment of alcohol withdrawal • phenytoin is said not to be as effective in the treatment of alcohol withdrawal seizures
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Drug Overdose (Intoxication)

Heroin	<ul style="list-style-type: none"> - Respiratory Depression (Low RR) - Low BP - Low HR
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		<ul style="list-style-type: none"> - Pinpoint pupils (constricted pupil) - Constipation • Give Naloxone
	Cocaine	<ul style="list-style-type: none"> - High RR - High BP - High HR - Mydriasis (dilated pupils) - Hyperthermia and sweating - Restlessness and Agitation
	Ecstasy	<ul style="list-style-type: none"> • neurological: agitation, anxiety, confusion, ataxia • cardiovascular: tachycardia, hypertension • hyponatraemia • hyperthermia • rhabdomyolysis • uncontrolled body movements, Trismus. <p>Management</p> <ul style="list-style-type: none"> • supportive • dantrolene may be used for hyperthermia if simple measures fail

LSD (Lysergic Acid Diethylamide)	Mydriasis – Flushing and sweating – Hyperreflexia-Diarrhea – Paraesthesia Delusions and Hallucinations (Pathognomonic) - a patient smelling colours and seeing sounds → LSD
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Notes on withdrawal:

- ☐ **Heroin** → ↑ body secretions (watery eyes, runny nose, diarrhea, sweating) + Pain (abdomen, muscles) + Others.
- ☐ **Cocaine** → **DEPRESSION** + Others.
- ☐ **Benzodiazepines** → Panic attacks + Others.
- ☐ **Alcohol** → Nausea, Vomiting, Irritability + tremors ± Hallucinations + Others

Notes on Overdose (Intoxication)

- ☐ **Heroin** → everything is decreased: low HR, Low RR, Low BP, Pinpoint (Constricted) pupils.
- ☐ **Cocaine** → The Opposite: high HR, high RR, high BP, Mydriasis (Dilated pupils).
- ☐ **LSD** → delusions, hallucinations, a patient sees sounds and smells colours.

- Key 49** ■ **Copper IUD** as an Emergency Contraception “after unprotected sex”
 → **inhibits Implantation** (inhibits fertilisation).
- **Oral Progesterone-only emergency contraceptive Pills** – Levonorgestrel
 → **inhibits Ovulation**

- Key 50** Rx of **ascites** secondary to Cirrhosis (alcohol abuse, ascites, spider naevi)
 → **Spironolactone** (Potassium-sparing diuretics). ✓

Key 51 **Commonly Asked Antibiotic Treatment (Important)**

Respiratory Conditions

Community Acquired Pneumonia (Mild)

Amoxicillin

Community Acquired Pneumonia (Moderate)

Amoxicillin + Clarithromycin

Community Acquired Pneumonia (Severe)

Co-amoxiclav + Clarithromycin

Co-amoxiclav = Amoxicillin + clavulanic acid
 e.g., Augmentin®

Pneumocystis Jirovecii “P. Carinii”	Co-Trimoxazole = (Trimethoprim + Sulfamethoxazole) = Bactrim®
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Tuberculosis (TB)	✓ First 2 months → (Ripe) → Rifampicin, Isoniazid, Pyrazinamide, Ethambutol. ✓ The next 4 months (Ri) → Rifampicin, Isoniazid.
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Aspiration Pneumonia	Amoxicillin + Metronidazole
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CNS (Meningitis)

Out-of-hospital Meningitis	Benzylpenicillin
In-hospital meningitis (most types)	Ceftriaxone
Listeria Meningitis	Ceftriaxone + Ampicillin + Gentamicin
Cryptococcal Meningitis	Amphotericin B
Meningitis Prophylaxis “for contacts”	✓ Ciprofloxacin “preferred” or: ✓ Rifampicin

Genitourinary Conditions

Lower uncomplicated UTI (in a non-pregnant ♀)	Trimethoprim or Nitrofurantoin
Candida albicans (Vulvovaginal Candidiasis)	Clotrimazole or Fluconazole
Trichomonas Vaginalis	Metronidazole
<ul style="list-style-type: none"> • Bacterial Vaginosis (Gardnerella Vaginalis) • Trichomonas Vaginalis 	Metronidazole
Cervicitis (Chlamydia)	<p>Recent Guidelines for the management of Cervicitis (September 2019)</p> <p><u>Chlamydia</u></p> <p>☐ 1st line → Doxycycline 100 mg BID for 7 Days.</p> <p>☐ Another line:</p> <p>Azithromycin 1-gram PO</p> <p>Followed by 500 mg PO OD for 2 days.</p>
Cervicitis (N. Gonorrhea)	<p><u>Neisseria gonorrhoea</u></p> <p>☐ Ceftriaxone 1 gm IM (single dose). Or:</p> <p>☐ Ciprofloxacin 500 mg PO (Single dose).</p>

PID “Pelvic Inflammatory Disease”	Differs based on hospital guidelines, one example: (CDM)
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**Ceftriaxone + Doxycycline +
Metronidazole**

Syphilis	Penicillin G
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Genital Herpes “HSV”	Aciclovir
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GIT Conditions

Salmonella/ Shigella/ Campylobacter	Erythromycin or Azithromycin or Clarithromycin
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Or **Ciprofloxacin**

Clostridium Difficile “Pseudomembranous colitis”	✓ Oral Metronidazole “first line” ✓ Vancomycin “if severe”
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H. Pylori	OAC Regimen (triple therapy)
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✓ Omeprazole (PPI)

✓ Amoxicillin

✓ Clarithromycin

ENT Conditions

Acute “bacterial” Otitis Media	Amoxicillin
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URTI “Pharyngitis/ Tonsillitis/ Laryngitis”	Phenoxymethylpenicillin
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Other Conditions

Cellulitis	Flucloxacillin
Mastitis	
Diabetic Foot Infection	
Septic arthritis	Flucloxacillin + Sodium Fusidate
Osteomyelitis	
Scabies	5% Permethrin
Toxoplasmosis	Pyrimethamine + Sulfadiazine

Key 52 ■ **Lithium and NSAIDs** e.g., ibuprofen Interaction:

- ↑ renal reabsorption of lithium i.e., ↓ renal clearance of lithium v.
- ↑ Risk of lithium Toxicity.

	<p>Note, Diuretics and NSAIDs (e.g. Ibuprofen) and Aspirin increase renal reabsorption of lithium and hence, the serum lithium increases and may lead to toxicity.</p> <hr/>
Key 53	<p>Liver cancer + Hiccups.</p> <p>Give → Metoclopramide</p>
Key 54	<p>Check lithium levels 12 hours after taking the last lithium dose (as it has a narrow therapeutic range)</p>
Key 55	<p>A patient with DM and HF has been recently prescribed a new medication. He now presents with polyphonic wheeze and bronchoconstriction. What is the likely cause?</p> <p>→ Beta blockers (e.g., Bisoprolol/ Atenolol).</p> <hr/> <p>■ Beta-blockers (e.g. Atenolol, Bisoprolol) important side effect → Bronchoconstriction.</p> <p>■ Beta-Agonist (e.g. Salbutamol) important side effect → Tachycardia.</p>

Key 56 A Diabetic patient with heart failure on beta-blockers, ACE inhibitors, insulin and furosemide was found to have hypokalemia. What is the likely cause?

→ **Furosemide**.

(Loop diuretics such as furosemide are used in the treatment of heart failure, and can cause hypokalemia).

HypOkalemia

- **Loop Diuretics** (e.g. **Furosemide**)
- **Thiazide-like diuretics**
(e.g. **bendroflumethiazide**, **indapamide**)
- **Vomiting** and **Diarrhea**
- **Villous Adenoma**
- **Renal tubular failure**
- **Cushing Syndrome**
- **Conn's disease** (**1ry hyperaldosteronism**)

HypeRkalemia

- **ACE inhibitors.**
- **Potassium-sparing diuretics**
(e.g. **Spironolactone**/ **Eplerenone**)
- **CKD.**
- **Addison's** (**1ry Adrenal Insufficiency**).
- **Congenital Adrenal Hyperplasia.**

Key 57 A patient with hypertension on treatment presents complaining of ankle swelling. The likely cause of this ankle oedema is:

→ **Amlodipine** (a Calcium channel Blocker).

2 Important Side effects of Calcium Channel Blockers (e.g. Diltiazem) to be remembered:

☐ **Ankle Swelling**

☐ **Gingival Hyperplasia**

So, for one who take CCB such as *diltiazem, amlodipine, verapamil, nifedipine*, he might get swelling of his → Ankle/ Gingiva.

Key 58 ☐ before commencing **Lithium**, order:

♣ **Thyroid Function Tests**. And:

♣ Kidney Function Tests.

☐ Before prescribing **Amiodarone**

→ Serum **Electrolytes**
and **Urea** measurements should be obtained.

Key 59 An asthmatic patient on 2 inhalers presents complaining of tremors, muscle twitching and shaky hands after using one inhaler. What is the likely cause?

→ **Salbutamol (SABA).**

Important Side Effects

■ **Calcium Channel Blocker** (e.g. Diltiazem, Verapamil, Amlodipine)

→ Ankle Swelling, Gingival Hyperplasia.

■ **Beta-blockers** (e.g. Atenolol)

→ Bronchoconstriction (Wheezes, SOB, heavy chest...).

■ **Beta-Agonist** (e.g. Salbutamol)

→ Tachycardia/ Palpitations/ Muscle twitching and tremors/ Shaky hands

■ **ACE inhibitors** (eg, lisinopril, enalapril)

→ Dry cough (Give ARBs eg, **Losartan** instead -important-), Hyperkalemia.

■ **Diuretics**

✓ **Loop (furosemide)** → Hyponatremia, Hypokalemia, Gout (hyperuricemia).

✓ **Thiazide (bendroflumethiazide)** → Hyponatremia, Hypokalemia, Gout, Postural

hypotension, Hyperglycemia

✓ **Potassium sparing (spironolactone)** → Hyponatremia, Hyperkalemia, Gynecomastia.

■ **Metoclopramide**

✓ **Extrapyramidal effects** → dystonia, akathisia, parkinsonism, bradykinesia, tremors.

✓ **Neuroleptic malignant syndrome** → high fever, sweating, tachycardia, agitation, confusion, muscle rigidity, neck stiffness.

■ **Haloperidol** → Sexual Dysfunction + Gynecomastia.

■ **Fluoxetine (SSRI)** → Anorgasmia (delayed ejaculation). Other: hyponatremia

So, in a man who has erection but no or delayed ejaculation → Fluoxetine

Key 60	<p>A hypertensive patient on Enalapril (ACE inhibitor) developed annoying dry cough.</p> <p>→ (Give ARBs eg, Losartan instead -important-).</p>
Key 61	<p>☐ In any patient on Warfarin, the most important symptom that he needs to urgently report is</p> <p>→ HEADACHE</p> <p><i>(This is because people on warfarin are liable to subdural hematoma which presents with headache and other features)</i></p> <p>☐ In any patient on Bisphosphonates, the most important symptom that needs to be urgently reported is</p> <p>→ Severe, sudden Heartburn or Chest pain (either is correct)</p>
Key 62	<p>A 29-year-old female presents with sore throat. She has poorly controlled asthma. Her medications for asthma include beclomethasone, montelukast, salbutamol, salmeterol and Aminophylline. She developed white patch on the pharynx that dislodges easily. What is the cause of her sore throat?</p> <p>a) Aminophylline</p> <p>b) Beclomethasone</p>

	<p>c) Salmeterol</p> <p>d) Salbutamol</p> <p>e) montelukast</p> <p>■ Among the common side effects of Inhaled Corticosteroids (Beclomethasone)</p> <p>→ Oral/ Pharyngeal Candidiasis, Sore Throat, Dry mouth and throat.</p> <p>■ Among the common side effects of SABA (Salbutamol)</p> <p>→ Tachycardia, Palpitations, Tremors, Shaky hands.</p>
Key 63	<p>■ Excess intake of SSRIs (eg, Fluoxetine, Sertraline, Citalopram)</p> <p>→ fever, sweating, tachycardia, agitation, confusion, muscle rigidity/ twitching, neck stiffness, others</p> <p>→ Serotonin Syndrome.</p> <p>■ Excess intake of Dopamine antagonist (eg, Metoclopramide/ Haloperidol), or potent antipsychotics (eg, Clozapine).</p> <p>→ fever, sweating, tachycardia, agitation, confusion, muscle rigidity/ twitching, neck stiffness, others.</p> <p>→ Neuroleptic Malignant Syndrome.</p>
Key 64	<p>■ A lung cancer patient with shoulder pain has been shifted from oral morphine to fentanyl patch due to nausea caused by oral morphine. He was also given metoclopramide for nausea and vomiting. A few hours later, his</p>

	<p>neck has become weak and stiff. What is the reason for these new symptoms?</p> <p>→ Side Effect of Metoclopramide treatment.</p>
Key 65	<p>A man with bipolar disorder for 10 years and knee pain for which he takes ibuprofen develops tremors, vomiting and confusion while travelling a long distance.</p> <p>The most appropriate test to be done → Serum Lithium concentration.</p> <p>Note, Diuretics and NSAIDs (e.g., Ibuprofen) increase renal reabsorption of lithium and hence, the serum lithium increases and may lead to toxicity.</p>
Key 66	<p>A renal cancer patient who was on morphine with good pain control started vomiting, and was placed on metoclopramide. He developed neck stiffness and rigidity. What is responsible for the symptoms?</p> <p>a. side effect of metoclopramide</p> <p>b. side effect of opioid</p> <p>c. meningitis</p> <p>d. cerebral metastasis</p>

■ Excess intake of **SSRIs** (eg, Fluoxetine, Sertraline, Citalopram)

→ fever, sweating, tachycardia, agitation, confusion, muscle rigidity/twitching, neck stiffness, others

→ **Serotonin Syndrome**.

■ Excess intake of **Dopamine antagonist** (e.g. **Metoclopramide/ Haloperidol**), or **potent antipsychotics** (e.g. **Clozapine**).

→ fever, sweating, tachycardia, agitation, confusion, muscle rigidity/twitching, neck stiffness, others.

→ **Neuroleptic Malignant Syndrome**.

Key 67 A man with chronic liver impairment being started on a new drug that is lipid soluble, strongly binds to albumin and undergoes hepatic first pass metabolism. What adjustments are to be made?

a) Give normal dose and shorten dosing interval.

b) No adjustment required

c) reduce dose and shorten the dosing interval

d) **reduce dose and increase the dosing interval**.

e) increase dose and increase the dosing interval

Since his liver is not functioning well, this would result in higher concentrations of the new medication being flowed into the systemic circulation. (the liver will not filter it well = ↓ hepatic first pass effect).

So, to reduce a possible drug toxicity, the dose needs to be reduced and given on wider intervals.

Key 68 A Transgender woman (male to female) on spironolactone, oestrogen, Co-codamol, lansoprazole, ramipril presents with hair loss and oesophageal reflux. Background history of hypertension and osteoarthritis. Most like cause of hair loss?

a. **Oestrogen**

b. Spironolactone

c. Lansoprazole

d. Co-codamol

e. Ramipril

✓ Oestrogen can cause hair loss.

✓ Spironolactone is an anti-androgen (i.e. reduce the hair loss theoretically)

Key 69 A patient in depression. Switched from fluoxetine to citalopram. Presents with painful right red eye with visual blurring.

- A. fusidic acid eye drop
- B. Urgent referral to psychiatric
- C. **Urgent referral to ophthalmology**
- D. clomipramine

Citalopram (a SSRI) is associated with acute angle-closure glaucoma as one of the side-effects.

Key 70 Young lady with acne/ pigmentation on her face relating to menstrual cycles. She was prescribed Benzoyl Peroxide and (some other drug). These drugs acts against which group of bacteria?

- a. **Propionibacterium**
- b. Staphylococcus
- c. Streptococcus
- d. Bacteroides

Adding topical benzoyl peroxide (BPO) to the antibiotics can reduce resistant Propionibacterium acnes in patients with acne receiving antibiotic therapy.

Key 71 A man who had cellulitis originating from ankle and spreading. Culture revealed MRSA resistant staph aureus. What is the initial treatment?

- a. Flucloxacillin
- b. piperazine and tazobactam
- c. **vancomycin**
- d. meropenem
- e. amoxicillin

What is the drug of choice in treating MRSA?

✓ **MRSA (Methicillin-Resistant Staphylococcus Aureus)**

✓ **Vancomycin** continues to be the drug of choice for treating most MRSA infections caused by multi-drug resistant strains.

✓ Clindamycin, co-trimoxazole, fluoroquinolones or minocycline may be useful when patients do not have life-threatening infections caused by strains susceptible to these agents.

Key 72 Patient with fever, cough, breathlessness. He is on certain medications including simvastatin, Bisoprolol. He is also Diabetic and hypertensive on ramipril, simvastatin and metformin. Patient is to use erythromycin. What's the next thing to do?

A) **Withhold simvastatin**

B) give half dose of erythromycin

C) reduce simvastatin dose

D) stop Bisoprolol

E) stop Metformin

When using macrolides (e.g. **Clarithromycin, Erythromycin**),

→ **STOP SIMVASTATIN!**

In other words,

Concomitant use of Clarithromycin + Simvastatin is Contraindicated!

Note, Clarithromycin + Atorvastatin (not Simvastatin) is OK.

Key 73 **Burning Pain. Type 1 Diabetes Mellitus with retinopathy and nephropathy. Which drug to give for his neuropathic pain? (No amitriptyline in options)**

A. Naproxen

B. topiramate

C. **Duloxetine**

D. Steroids

In Diabetic Neuropathy:

Neuropathic pain can present in any form of the following:

(**Burning**), (**Tingling**), (**Numbness**), (**Itching**), (**Paraesthesia**), (**Shooting/ Stabbing**)

Example, a diabetic patient with ankle ulcer with agonising Burning Pain.

Rx? → **Amitriptyline** (1st line) or **Gabapentin** or **Duloxetine** or **Pregabalin**.

Away Goes D neuropathic Pain

(+) **Good glycemic control**

Key 74 A 34-year-old woman presents with itchy rash. She is a taxi driver and requests medication that will not affect her alertness. She has an urticaria like rash. What is the most appropriate medication?

A. **Cetirizine tablets**

B. Chlorpheniramine tablets

- C. Hydroxyzine tablets
- D. Hydrocortisone tablet
- E. Prednisolone Tablet

She requires **NON-SEDATING** anti-histamine such as **Cetirizine**, **Loratadine**.

Note, **Chlorpheniramine** is **Sedating** anti-histamine.

Key 75 A 32-year-old man presents with erectile dysfunction of 2 months. He had depression 3 months ago and was started on Sertraline. He has no medical history of note. What is the most likely reason for his symptoms?

- A. **Sertraline side effects**
- B. Autonomic neuropathy
- C. Performance anxiety
- D. Depression

SSRI-induced **sexual dysfunction** can occur in both men and women.

SSRIs examples → **(Fluoxetine, Sertraline, Citalopram)**

Key 76 **Pain ladder (Analgesia Ladder)**

- 1) Simple analgesia → Paracetamol, NSAIDs, Aspirin.
- 2) Weak opiates → Codeine, Tramadol, Dihydrocodeine.
- 3) Strong opiates → Morphine, Fentanyl patches, Diamorphine, Oxycodone.

✓ Remember, we should **not** go back on the pain ladder, we either go forwards, ↑ dose, replace to a stronger option or add-on. (No Backward on the ladder).

✓ Fentanyl patches have a slow onset of action; therefore, they should be avoided in a patient who is **still in pain**.

Key 77 A 44 YO woman had rib fracture and is now due for discharge. She still needs pain relievers at home. Knowing that she has bipolar disorder and is on lithium, what is the most appropriate pain killer for her among the options?

- A. **Codeine**
- B. Aspirin
- C. Diclofenac
- D. Naproxen
- E. Ibuprofen

☐ Lithium and (NSAIDs) e.g. ibuprofen interaction:

→ **↑ renal reabsorption of lithium** i.e., **↓ renal clearance of lithium ✓**.

→ **↑ Risk of lithium Toxicity.**

Note, **Diuretics** and **NSAIDs** (e.g., Ibuprofen) and Aspirin increase renal reabsorption of lithium and hence, the **serum lithium increases** and may lead to toxicity.

✓ Therefore, NSAIDs (e.g., Ibuprofen, Diclofenac, Naproxen) should not be used in concurrence with lithium as they can increase the serum concentration of lithium and thus lead to lithium toxicity.

✓ Codeine is safe to be used with lithium.

✓ Aspirin is not a typical pain killer for injuries.

Key 78 **Notes on: Co-careldopa (Sinemet ®)**

✓ **Co-careldopa** = **Levodopa** + **Carbidopa** combined together.

✓ Used in the treatment of **Parkinson's disease**.

✓ **Sudden cessation of Co-careldopa can result in Akinesia.**

✓ **Akinesia** = inability to move muscles voluntarily.

✓ If a Parkinson patient on **Co-careldopa (Sinemet ®)** develops hallucination

→ **Reduce the dose of Co-careldopa**

Key 79	Important Side Effects of TB Medications		
	<table border="1"> <tr> <td data-bbox="142 369 654 804"> Isoniazid (INH) </td><td data-bbox="654 369 1563 804"> Peripheral Neuropathy (Give Vit. B6) Hepatitis INH (3 letters) → SLE </td></tr> </table>	Isoniazid (INH)	Peripheral N europathy (Give Vit. B6) H epatitis INH (3 letters) → SLE
Isoniazid (INH)	Peripheral N europathy (Give Vit. B6) H epatitis INH (3 letters) → SLE		
	<table border="1"> <tr> <td data-bbox="142 825 654 1194"> Rifampicin </td><td data-bbox="654 825 1563 1194"> Red-orange urine and secretions P450 induction Hepatitis </td></tr> </table>	Rifampicin	Red-orange urine and secretions P 450 induction Hepatitis
Rifampicin	Red-orange urine and secretions P 450 induction Hepatitis		
	<table border="1"> <tr> <td data-bbox="142 1215 654 1377"> Pyrazinamide </td><td data-bbox="654 1215 1563 1377"> ↑ Uric Acid (Hyperuricemia) → Gout </td></tr> </table>	Pyrazinamide	↑ U ric Acid (Hyperuricemia) → Gout
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	<table border="1"> <tr> <td data-bbox="142 1398 654 1768"> Ethambutol </td><td data-bbox="654 1398 1563 1768"> Visual (Eye) Problems: e.g. Red-green discrimination. Retrobulbar neuritis, ↓ Visual acuity. </td></tr> </table>	Ethambutol	Visual (E ye) Problems: e.g. Red-green discrimination. Retrobulbar neuritis, ↓ Visual acuity.
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	<table border="1"> <tr> <td data-bbox="142 1789 654 1871"> Streptomycin </td><td data-bbox="654 1789 1563 1871"> Ototoxic → Deafness </td></tr> </table>	Streptomycin	O totoxic → Deafness
Streptomycin	O totoxic → Deafness		

(**Contraindicated**
in pregnancy) ✓

Example:

A patient was diagnosed with TB and now presents with orange urine and sweats and mildly elevated liver enzymes.

The likely cause → **Rifampicin**

Key
80

Patients with diarrhea are at risk of dehydration (due to loss of body fluid in the stool). Therefore, it is important to consider stopping any diuretic drugs being used to avoid dehydration.

Example:

A patient with gastroenteritis presents with diarrhea of 3 days. He is on a number of medications: Citalopram, Warfarin, Indapamide, Allopurinol and Corticosteroids.

Which drug needs to be currently ceased?

→ **Indapamide**

✓ **Indapamide is a thiazide-like diuretic.**

✓ Diuretics should be stopped if there is diarrhea because of the risk of dehydration.

✓ Other examples of diuretics:

- Loop Diuretics (e.g. Furosemide)
- Thiazide-like diuretics (e.g. bendroflumethiazide, indapamide)
- Potassium-sparing diuretics (e.g. Spironolactone/ Eplerenone)

Key 81 **An asthma patient is currently on different medications, one of which is theophylline 120 mg. The treating team want to increase the dose of theophylline by 25%. What will be the new dose?**

This is a question of a quick math.

25% means $\frac{1}{4}$

So, divide the current dose by 4 and add the result to the current dose.

$$120/4 = 30$$

$$30+120 = 150$$

Therefore, the new dose would be **150 mg**.

“Such mathematic questions have been recently targeted in the PLAB 1 Test”.

Key
82 A patient in status epilepticus is given IV lorazepam but is still having fits. **20mg/kg** Phenytoin is decided to be given at a rate of **50mg/minute**. The patient's weight is **100 Kg**. This means that the patient should receive the total dose of phenytoin over how many minutes?

This is another math question.

The dose of phenytoin to be given is 20mg/kg.

His weight is 100 Kg.

So, the total dose is **$100 \times 20 = 2000 \text{ mg}$**

The rate is 50mg/min.

So, **$2000/50 = 40 \text{ minutes}$** .

The answer is **40 minutes**.

"The patient will receive 2000 mg of phenytoin over 40 minutes at a rate of 50 mg/min".

"Such mathematic questions have been recently targeted in the PLAB 1 Test".

Key
83

• An opioid user presents with miosis, bradycardia, low respiratory rate

Give → **Naloxone**. "opioid overdose".

• An opioid user has been trying to stop for 2 weeks but still has withdrawal symptoms

Give → **Methadone**. "for detoxification, relieve withdrawal symptoms".

• An ex Opioid user has stopped using opioid and his urine shows no trace of opioids. He wants to stay away from opioid

Give → **Naltrexone**. "maintain abstinence".

Key
84

Dealing with Constipation

• **Impacted stool** → **phosphate enema**. "important".

However, if young, healthy, no comorbidities, try Glycerol suppositories first. "important".

- **Hard stool** → **stool softeners**.

The order of interventions for constipations in general are as follow:

- **High fibre (residue) diet + ↑ fluid intake, exercise (conservative)**
- **Senna (Stimulant Laxatives).**
- **Lactulose or Macrogol (Osmotic “Bulk-forming” Laxatives)**
- **Add a prokinetic agent (such as domperidone, metoclopramide, erythromycin)**
- **Dantron.**
- **Seek specialist advice.**

N.B. Senna is tried before lactulose in general.

However, *in pregnancy*, **we use Ispaghula “1st line”** or **lactulose “2nd line”** as Senna might ↑ abdominal discomfort.

Important Notes (1)

In short, for constipation, after trying conservative management (increase fluid intake and high-fibre diet and exercise), the first line is as follows:

♦ **In general,** → **Senna (stimulant laxative).**

♦ **In pregnancy: ILS**

✓ **First line** → **Isphaghula husk** (bulk-forming laxative).

✓ **Second line** → **Lactulose** (osmotic laxative).

✓ **Third line** → **Senna** (stimulant laxative).

Important Notes (2)

Opioid-induced constipation (eg, constipation after taking codeine)

→ **Glycerol suppositories**.

- Glycerol suppositories have both stimulant + stool-softening actions.

Important Notes (3)

Constipation in Palliative Care Patients

■ For most cases of chronic constipation in palliative patients

→ **Macrogol** (osmotic laxatives). (each sachet is dissolved in half a glass of water).

■ For opioid-induced constipation in palliative patients

- → **Senna** (could be given tablets or syrup based on the ability to swallow).
- Another option → **Bisacodyl** (per-rectal suppository).

✓ Both senna and bisacodyl are (stimulant laxatives).

✓ Senna is preferred in those who can swallow (either syrup or tablets) because it is easier to use regularly.

	<p>✓ Bisacodyl suppository has a faster onset of action but because it is a suppository, it is less preferred.</p> <p>✓ Avoid senna and bisacodyl (stimulant laxatives) in bowel obstruction.</p>
Key 85	<p>A 35 YO presents complaining of sudden onset of abdominal pain, drowsiness, nausea but no vomiting, darker urine for 2 days. He is on sodium valproate for his epilepsy. There is no fever. What investigation is most appropriate?</p> <p>→ Liver function test.</p> <p>■ Sodium valproate + (abdominal pain, vomiting, anorexia, drowsiness, jaundice)</p> <p>→ suspect liver impairment or pancreatitis.</p> <p>Before commencing sodium valproate, check:</p> <p>→ Liver function test.</p> <p>Also:</p>

→ **Full blood count**. “For any risk of potential bleeding as sodium valproate can cause blood disorders”.

Also “in women in child-bearing age”

→ **pregnancy test**. “Sodium valproate is highly teratogenic”.

Key 86 A 50 YO man has been diagnosed with hypertension and his GP wants to start him on lisinopril (ACE inhibitor). What investigation should be requested prior to lisinopril regimen?

→ **Renal function test and electrolytes (esp. serum potassium)**.

✓ eGFR baseline needs to be measured before starting ACEIs. The dose of ACEI may need to be adjusted if there is renal impairment.

(needs to be **repeated 1-2 weeks** after initiating ACEIs for fear of AKI, then annually).

✓ If after initiating ACEI, renal function tests deteriorate

→ consider: renal artery stenosis.

✓ Also remember that ACEIs can cause hyperkalemia.

A 70 YO man with HF has been diagnosed with hypertension and his GP wants to start him on lisinopril (ACE inhibitor). His baseline renal function tests are within normal. What investigation should be requested after starting ACE inhibitor?

→ **Renal function test in 2 weeks.**

Key 87 An elderly man has recently been treated for infective COPD exacerbation. He now has hallucination and claims that he chats with the queen of England. He insists that there are aliens invading his room. This behavioural change is sudden. What is the likely medication that caused this condition and what is the likely diagnosis?

Likely Dx → **Corticosteroid-induced psychosis.**

The likely causative medication → **Prednisolone** “that has been recently used to treat his COPD exacerbation”.

Key 88 Remember that Beta 2 agonists e.g., **salbutamol**, terbutaline can cause → **Hypokalemia** “low serum potassium”. **Imp v**

Key 89	<p>A 66 YO woman has recently completed a 10-day use of co-amoxiclav for cellulitis presents complaining of:</p> <p>Fatigue, nausea, vomiting, dark urine and itching.</p> <p>ALT is high: 150 (normal is up to 35).</p> <p>ALP is 180 (normal is up to 60).</p> <p>ALP, GGT and Bilirubin are elevated.</p> <p>Abdominal U/S shows no evidence of biliary obstruction or gallstone.</p> <p>She drinks 5 units of alcohol per week.</p> <p>What is the most likely Dx?</p> <p>[Alcoholic hepatitis / Hepatitis B / Cholestatic hepatitis / Choledocholithiasis]</p> <p>✓ Alcoholic hepatitis: her drinking Hx is not significant “only 5 units/ week”.</p> <p>✓ Hepatitis B: Her ALT is not extremely high. No points mentioned in the question favouring hepatitis B.</p> <p>✓ Choledocholithiasis “gallstones in the bile duct”: U/S abdomen excludes this option.</p> <p>○ Cholestatic hepatitis → Old age, Hx of a recent use of co-amoxiclav (Augmentin) “drug-induced hepatotoxicity”.</p>
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Features: **dark urine, itchiness “pruritis”, fatigue, nausea, vomiting, abdominal pain.**

Labs: **↑ ALT, ↑ ALP “alkaline phosphatase”, ↑ GGT, ↑ bilirubin.**

Important Differentials of Liver Disease

- **Primary Biliary Cirrhosis** → Middle-aged female, Pruritus, Jaundice, ↑ ALP, associated with **Sjogren’s Syndrome**.
Investigation: **Anti-Mitochondrial Antibodies**.
- **Primary Sclerosing Cholangitis** → the same but the association is usually IBD (mainly **Ulcerative colitis**).
Investigation: **ERCP**
- **Autoimmune hepatitis** → Early-middle aged female, abnormal ALT and AST, **Normal or mildly elevated ALP ± 2ry Amenorrhea** ± another autoimmune disease (e.g. **hypothyroidism**, vitiligo, rheumatoid arthritis, celiac, pernicious anemia)
- **Alcoholic Liver Disease** → Hx of **heavy alcohol consumption**. Signs of liver disease/ cirrhosis: Ascites, Hematemesis, Jaundice, Hepatomegaly, Spider naevi. Both AST and ALT are elevated; however, AST is more elevated than ALT: **↑ AST:ALT ratio** (e.g. AST:150, ALT: 70). Gamma Glutamyl Transferase (**GGT**) is also **increased**.

- **Cholestatic hepatitis** → Old age, Hx of **a recent use of co-amoxiclav (Augmentin)** “drug-induced hepatotoxicity”.

Features: **dark urine**, **itchiness “pruritis”**, **fatigue**, **nausea**, **vomiting**, **abdominal pain**.

Labs: **↑ ALT**, **↑ ALP** “alkaline phosphatase”, **↑ GGT**, **↑ bilirubin**.

Key 90 A 60 YO man known case of hypertension, diabetes mellitus and a previous TIA presents complaining of a 5 day of diffuse muscle pain and weakness in his lower limbs. He is on: ramipril, bisoprolol, aspirin, metformin and simvastatin. His urine shows myoglobin. His kidney function tests are deteriorated. His serum creatinine kinase (CK) is 3000 (Normal: 45-260).

✓ The likely Dx → **Rhabdomyolysis**.

✓ The likely causing medication that needs to be stopped → **Simvastatin**.

Although uncommon, one of the side effects of **statins** is Rhabdomyolysis.

*Rhabdomyolysis is explained with examples in the **Nephrology** chapter*

Rhabdomyolysis

- As skeletal muscles are dying → they release (**Myoglobin**, **Potassium**, **Creatine Kinase...**).

- **Common Scenarios and Hints:** (Important ✓)

- ✓ A person was trapped for several hours under a heavy object.
- ✓ A fall followed by a long period of lying on the floor.
- ✓ An elderly with frequent falls presents with Acute kidney injury.
- ✓ IV drug abuser was found on the floor not moving for a long period.
- ✓ Long-distance run (e.g. Marathon runner) “Severe Exertion/ Severe Dehydration”.
- ✓ Severe Crush injury.
- ✓ Exercise-induced rhabdomyolysis (e.g. in athletes)
- ± Hematuria (**Reddish Brown or Tea-coloured urine**) (False Positive as the cause of redness is myoglobin (which has heme), while RBCs are not found in urine dipstick).
- ± Hypotension.
- ± AKI “Acute kidney injury” → (High urea and Creatinine).
- ± Very high CK (Creatine Kinase).

✓ Although uncommon, one of the side effects of **statins** is Rhabdomyolysis. ✓

- **Myoglobin** is **nephrotoxic** and thus can lead to **Acute Kidney Injury (AKI)**. Therefore, rehydration with **IV fluid** is an **essential initial step**. That's why Rhabdomyolysis is a medical emergency that you have to be aware of!

- **ECG** must be performed as the released potassium from the dying muscles (**hyperkalemia**) can be dangerous. If ECG changes suggesting hyperkalemia (**Tall tented T wave, Wide QRS**) are found:

→ Protect the heart by giving **IV Calcium Chloride or IV Calcium Gluconate before anything else!**

■ Important points on Rhabdomyolysis:

✓ Main Complications of Rhabdomyolysis → **AKI** and **Hyperkalemia**.

✓ Initial management → **IV fluid** (to try to avoid acute kidney injury).

✓ Initial Investigation for management → **ECG**

✓ If **Tall T wave, Wide QRS**, the initial line → **give IV calcium chloride/ gluconate**.

✓ The best **initial** test that is **specific for Rhabdomyolysis** → **Urine analysis** → Reddish-brown (Tea-coloured) → Falsely +ve hematuria.

✓ **To confirm** → **CPK level** (**Creatine Phosphokinase**) "it indicates muscle necrosis".

✓ Other lines of treatment include: Sodium Bicarbonate ■ Dialysis (in severe cases)

Key 91	<ul style="list-style-type: none"> • We know that long-use of “inhaled” corticosteroids can cause → oral thrush. • However, short-term use of “oral” corticosteroids can cause → Sleep disturbance, restlessness, indigestion. <p>In a recent exam, a man with asthma exacerbation had been advised to take oral prednisolone for 5 days. What is the more likely side effect to develop?</p> <p>→ Sleep disturbance.</p> <p>“Oral thrush was among the options. However, sleep disturbance is more common. Also, oral thrush is more common with inhaled steroids”.</p>
Key 92	<p>One of the important side effects of SSRIs (e.g., Citalopram):</p> <p>→ it increases the risk of fall especially in the elderly</p> <p>(As it can cause hyponatremia which leads to unstable gait).</p>
Key 93	<p>One of the important side effects of SNRI (e.g., Duloxetine):</p> <p>→ it increases the risk of fall especially in the elderly</p> <p>(As it can cause postural hypotension and impaired psychomotor function).</p> <p>So, both SSRIs (eg, Citalopram) and SNRIs (eg, Duloxetine) can cause frequent falls especially in the elderly.</p>

SSRI = selective serotonin reuptake inhibitors.

SNRI = serotonin noradrenaline reuptake inhibitors.

Key 94 **Important:**

▣ For mild community acquired pneumonia:

→ **Amoxicillin**

▣ If penicillin-allergic

→ **Clarithromycin** “first” or **Doxycycline**.

▣ If penicillin allergic and the patient is on methadone for opioid dependence

→ **Doxycycline** ✓

(do not use clarithromycin with methadone → risk of QT prolongation)

Some drug-interaction risks:

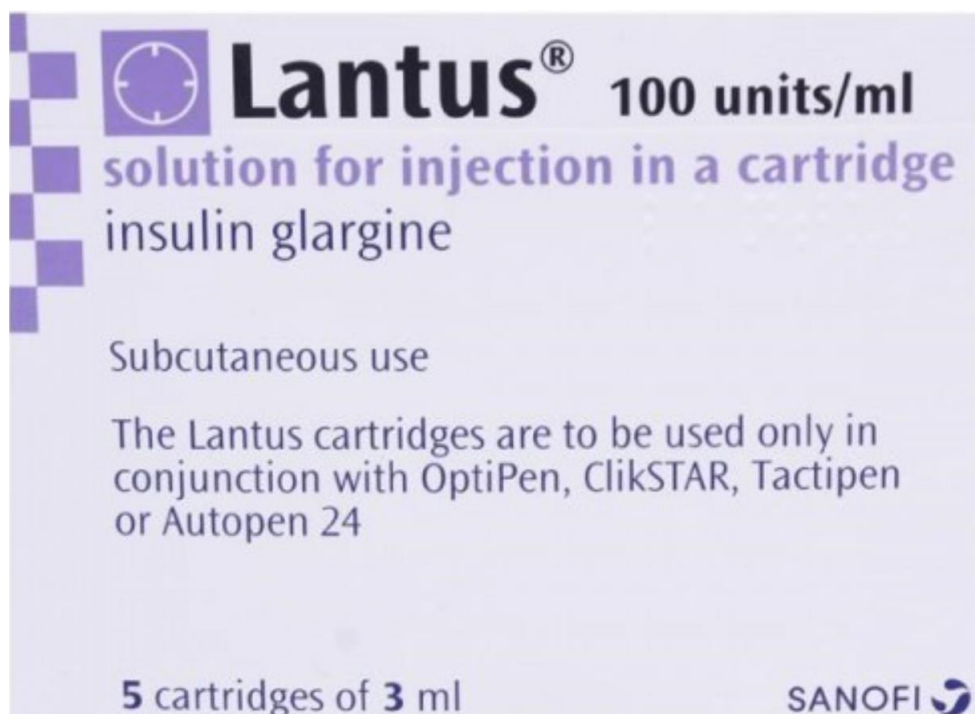
- Clarithromycin + Methadone → **QT interval prolongation**.
- Clarithromycin + Statin → **rhabdomyolysis**.
- Clarithromycin + salbutamol → **hypokalemia**.
- Metronidazole (Flagyl) + Alcohol → **Disulfiram-like reaction (headache, nausea, stomach pain)**. Thus, patients who drink alcohol and prescribed Metronidazole should **stop alcohol until after 48 hours of treatment end**.

Key 95 For local anaesthesia, why is adrenaline sometimes added with the lidocaine (What is the benefit of this combination of **adrenaline** + **lidocaine**)?

→ To **PROLONG** the duration of the local anaesthesia.

Adrenaline → constricts blood vessels → delays the absorption of lidocaine.

Key 96 A patient with DM type 1 is at a GP clinic for his regular insulin refill. The patient shows the GP a picture of his empty insulin box. He shows the GP his ClickSTAR pen. He tells the GP that he is using 86 units each evening. What should be written in the prescription?



- **Units** and **International units** should be written fully, do not use U or IU.

- Insulin prescription has to include the “**Brand**” name.
- If the patient is using it via **reusable pen**, not injections, this should be included in the prescription. (As is shown here in the picture and in the stem).

Therefore, the right prescription would be as follows:

→ Insulin glargine (**Lantus**) 100 **units**/ml **penfill** 3 ml cartridges 86 units subcutaneously each evening.

Key 97 A patient with DM type 1 is at a GP clinic for his regular insulin refill. The patient shows the GP a picture of his empty insulin box. He tells the GP that he is using 78 units each night. What should be written in the prescription?



Here, both brands **Lantus** and **Solostar** have to be included.

Also, this is to be injected in a “**pre-filled pen**” as is shown in the picture. This has to be included.

→ Insulin glargine (**Lantus**) **pre-filled SoloStar pen** 78 units each night.

In the previous example, the patient has his “reusable” pen and needed the box that contains solutions (**penfill** = cartridges). Here, as is written on the box, **pre-filled pens** (disposable). Also here, SoloStar “brand for disposable insulin Lantus pens” should be included besides “Lantus”.

Key
98

Smoking → ↑ the CYP1A2 enzyme. (a potent inducer).

Clozapine → atypical antipsychotic drug. It is metabolised by CYP1A2 enzyme.

Therefore:

If a smoker wants to stop smoking, **the dose of clozapine has to be lowered.**

(Because of the fear of clozapine toxicity)

Clarification:

When he stops smoking, the activity of CYP1A2 enzyme will be decreased

→ So, the metabolism of clozapine will also decrease (leaving a lot of it in body) → Thus, **after quitting smoking** → **reduce clozapine dose.**

Another valid answer → **measure the clozapine levels.** (fear of toxicity).

Key 99 A 40 YO man had a fight with his wife and then he drunk large quantity of alcohol + a bottle of medication. This was 2 days ago. Today, he has developed severe epigastric pain (abdominal pain) & vomiting 6 hrs ago. His LFTs are abnormal.

What is the most likely medication being used in excess?

(Aspirin, Paracetamol, amitriptyline, or Fluoxetine)?

The likely medication is → **Paracetamol**.

• Paracetamol overdose:

✓ After 12-36 hrs → nausea, vomiting, abdominal pain.

✓ After 2-3 days → hepatic necrosis; subcostal pain and tenderness. Acute kidney injury. Hepatic encephalopathy.

• Aspirin overdose:

✓ Ringing in the ears (tinnitus).

✓ Impaired hearing.

✓ Rapid breathing (hyperventilation), (leading initially to resp. alkalosis but later on metabolic acidosis develops).

✓ Nausea and vomiting,

✓ Dehydration,

✓ Fever,

✓ Double vision,

✓ Feeling faint.

✓ Abd. Pain.

• Amitryptilin overdose:

Dilated pupils – Dry mouth – Dry flushed skin – Drowsiness – Hypotension – Urine retention – Severe Sedation – Tachycardia – PR, QRS, QT prolongation – Severe Acidosis

• Fluoxetine overdose:

Tremors – agitation – dilated pupils – drowsiness – GI symptoms – ORS and QT prolongation – Torsades de pointes.

Key
100

Examples on important calculations:

In the beginning, bear in mind that a concentration of:

1% → means: 10 mg/ml

And

0.5% → means: 5 mg/ ml

Example (1)

A 55 YO man weighs **100 kg** presents for a procedure. He was given **30 ml** of **0.5%** lidocaine without epinephrine prior to the procedure. If the maximum allowed dose is **3 mg/kg**, how much of 0.5% lidocaine can be given to him?

0.5% → 5 mg/ml (constant)

Max dose: 3mg/kg. He is 100 kg.

So, $3 \times 100 = 300 \text{ mg}$ (max dose)

5 mg -----→ 1 ml

300 mg -----→ (X) ml

$(X) = (300 \times 1) \div 5 = 60 \text{ ml}$

He was already given 30.

So, the remaining dose = $60 - 30 = 30 \text{ ml}$

Example (2)

A 42 YO man weighs **80 kg** presents for a procedure. He was given **20 ml** of **1%** lidocaine without epinephrine prior to the procedure. If the maximum allowed dose is **4 mg/kg**, how much of 1% lidocaine can be given to him?

1% → 10mg/ml (constant)

Max dose: 4mg/kg. He is 80 kg.

So, $4 \times 80 = 320 \text{ mg}$ (max dose)

10 mg -----→ 1 ml

320 mg -----→ (X) ml

(X) = $(320 \times 1) \div 10 = 32 \text{ ml}$

He was already given 20.

So, the remaining dose = $32 - 20 = 12 \text{ ml}$

Key
101

• Metronidazole (Flagyl) + Alcohol

→ Disulfiram-like reaction (headache, nausea, stomach pain).

Thus, patients who drink alcohol and are prescribed Metronidazole should

→ Avoid alcohol during treatment and for at least 48 hours after stopping treatment.

Key
102

Which of the following medications can precipitate falls in patients with postural hypotension and thus should be reduced or stopped?

(Ramipril – Metformin – Amitriptyline – Sitagliptin).

→ Ramipril.

■ Important S/E of ACE inhibitors (e.g., lisinopril, enalapril, ramipril)

• Dry cough (Give ARBs e.g., Losartan instead -important-),

• Hyperkalemia.

• Precipitate recurrent falls in patients who have postural hypotension.

Key
103**Important Notes on Clozapine**

- It is a psychiatric medication and is the first “**atypical antipsychotic**”.
- It is primarily **used to treat people with schizophrenia**.
- If a smoker **wants to stop smoking**, the **dose of clozapine has to be lowered**. (Because of the fear of clozapine toxicity).

Clarification: Smoking increases the metabolism (breakdown) of clozapine. When smoking is stopped, the metabolism slows down, leading to higher clozapine levels in the body, which can cause toxicity. So, clozapine dose must be checked and decreased.

- One of the feared **side effects** of **clozapine** is **agranulocytosis** (severely low WBCs especially **neutrophils**). Agranulocytosis manifests as (Fever, Chills, Muscle aches, Headache). The next step is to **request Full Blood Count (FBC)**. Remember that the antithyroid (**carbimazole**) can also cause **agranulocytosis**.

- **Clozapine** (atypical antipsychotic used mainly for schizophrenia) can cause **weight gain** (as a side effect). So, if a patient is on clozapine and developed depression and thus becomes in need to an antidepressant, do not use sertraline (SSRI), citalopram (SSRI), amitriptyline (tricyclic) or mirtazapine (tetracyclic) as they all also cause weight gain. We need an antidepressant that causes weight loss such as **Duloxetine** (a **serotonin and noradrenaline reuptake inhibitor -SNRI-**).

- **So, remember these 3 side effects of clozapine:**

✓ **Agranulocytosis:** ↓ ↓ WBCs (esp., neutrophils) + Fever, Chills, Muscle pain.

→ Request full blood count (FBC).

✓ Postural hypotension.

✓ Weight gain. (So, if he is on clozapine and needs antidepressant, → Duloxetine).

Recent 3 questions have been asked about Clozapine:

1) A smoker on clozapine and he wants to stop smoking

→ The dose of clozapine should be decreased.

2) A schizophrenic patient on clozapine developed high fever, chills, muscle aches and headache, sore throat. (i.e., agranulocytosis). What is the appropriate investigation?

→ Full blood count

(To look for WBCs and Neutrophils to establish the diagnosis of agranulocytosis).

3) A patient is on clozapine for schizophrenia has low moods. Since he started clozapine, his weight has increased markedly. What is the most appropriate antidepressant for him?

→ Duloxetine. (It is SNRI, its side effects include weight loss)

(Pick sertraline if duloxetine was not in the options. Even though both sertraline and citalopram are SSRI and indicated as first-line anti-depressants, citalopram has risk of QTc prolongation if co-prescribed with clozapine)

Key 104	<p>One of the feared and important side effects of carbimazole (a drug used to treat hyperthyroidism) is agranulocytosis (dangerously low WBCs especially neutrophils ie, neutropenia that can be asymptomatic or manifest with flu-like symptoms).</p> <p>A recent question asked about a side effect that should be instructed to a hyperthyroidism patient who is going to start on carbimazole. The answer was</p> <p>→ Neutropenia (low neutrophils) (ie, agranulocytosis but in a different way).</p> <p>So, remember that both clozapine (atypical antipsychotic) and Carbimazole (anti-hyperthyroidism medication) can cause agranulocytosis (ie, neutropenia) and FBC should be requested if suspected.</p> <p>Another question asks about a patient who is on carbimazole and developed flu-like symptoms with headache, chills, fever and muscle aches. What is the most appropriate investigation?</p> <p>→ Full blood count (FBC) to look for neutropenia to diagnose agranulocytosis.</p>
Key 105	<p>A 60 YO man has co-morbidities. He is on paracetamol, sertraline for depression, and some medications for previous MI including ticagrelor, bisoprolol, and atorvastatin, He has recently developed muscle pain in arms, shoulders and legs. What is the likely cause of his presentation?</p> <p>Atorvastatin can cause → statin-associated myalgia</p> <p>(Muscle pain in arms, shoulders, legs)</p>

Key 106	<p>■ The main neurotransmitter affected in Schizophrenia is → dopamine</p>
Key 107	<ul style="list-style-type: none"> • Ramipril (ACE inhibitor) → Can cause postural hypotension and thus ↑ falls. • Zopiclone → Insomnia treatment → can cause balance loss and thus ↑ falls. <hr/> <p>Q] An elderly man feels dizzy when he stands and loses balance and falls. He is on a number of medications: <u>ramipril</u> for hypertension, <u>zopiclone</u> insomnia, <u>cetirizine</u> for allergy of hay fever, <u>metformin</u> for diabetes, and <u>lithium</u> for bipolar disorder. He has postural hypotension (his diastolic BP while standing is > 10 mmHg lower than his diastolic BP while sitting). Which medication is the most likely reason for his recurrent falls?</p> <p>→ ACE inhibitors (Ramipril). They can cause postural hypotension → thus falls. Anti-hypertensive medications as ACE inhibitors and Calcium channel blockers can cause postural hypotension → dizziness on standing → Falls.</p> <p>Note: if there was no postural hypotension, we would suspect zopiclone (Although rare, it can lead to falls by balance impairments).</p>
Key 108	<ul style="list-style-type: none"> • What is the antiemetic of choice in patients with Parkinson's disease? <p>→ Cyclizine. ✓ Others: <u>domperidone</u>.</p> <p>Although <u>ondansetron</u> can be use in Parkinson; however; <u>not ideal for elderly!</u></p> <p>If vomiting persists in Parkinson's disease → Levomopromazine. (2nd line)</p>

Note that:

[**May Cause Parkinson**] ie, **M**etoclopramide, **C**innarizine and **P**rochlorperazine are contraindicated in Parkinson's disease patients as they may worsen symptoms.

Also, ~~never use haloperidol~~ in patients with Parkinson's disease.

Key 109 Remember that one important side effect of **SSRIs** [eg, **Citalopram**, **Fluoxetine**] is → **Hyponatremia**.

So, if a patient is on a number of medications and one of them is citalopram has developed **low serum sodium** (presented as **confusion**), think of **Citalopram** as the causing medication.

Key 110 **SSRIs during Pregnancy**

- **SSRIs** (eg, **sertraline**) have a small risk for **congenital heart defect** if used in **early pregnancy**.
- Therefore, it is recommended -if mild to moderate- depression to → **Stop sertraline (SSRIs) GRADUALLY**.
- "ie, **taper the dose of sertraline over 4 weeks and stop**".
- Never stop sertraline abruptly in pregnancy.

	<ul style="list-style-type: none"> • However, in scenarios where the depression is very severe, we may continue using sertraline (benefits outweigh risks).
Key 111	<p>A patient is on clozapine for schizophrenia has low moods. Since he started clozapine, his weight has increased markedly. What is the most appropriate antidepressant for him?</p> <p>→ Duloxetine. (It is SNRI, its side effects include weight loss)</p> <ul style="list-style-type: none"> • Clozapine (atypical antipsychotic used mainly for <u>schizophrenia</u>) can cause weight gain (as a side effect). So, if a patient is on clozapine and developed depression and thus becomes in need to an antidepressant, do not use sertraline (SSRI), citalopram (SSRI), amitriptyline (tricyclic) or mirtazapine (tetracyclic) as they all also cause weight gain. <u>We need an antidepressant that causes weight loss</u> such as Duloxetine (a <u>serotonin and noradrenaline reuptake inhibitor</u> -SNRI-). • Pick sertraline if duloxetine was not in the options. Even though both sertraline and citalopram are SSRI and indicated as first-line anti-depressants, citalopram has risk of QTc prolongation if co-prescribed with clozapine. • Other important side effects of clozapine: <ul style="list-style-type: none"> - Agranulocytosis (neutropenia) [FBC is needed] - Postural hypotension. - Weight gain.
Key 112	<p>■ One of the recently added (2022) <u>side effects</u> of [Metformin] is</p> <p>→ Vitamin B12 deficiency.</p>

So, in a diabetic patient who develops symptoms of vitamin B12 deficiency such as irritability, depression (low moods), fatigue and tiredness, weakness

→ Check serum vitamin B12 deficiency.

Rx → Correct vitamin B12 deficiency and continue on metformin.

■ Other side effects of Metformin:

Weight loss – Vit B12 deficiency – Nausea, vomiting – Stomach pain – Gases

Remember that being vegan, gastrectomy are risk factors for vitamin B12 def.

Key 113 A patient with type 2 DM is on metformin, dapagliflozin, gliclazide, atorvastatin. His HbA1c is 42 (normal is <48). He has developed erythema and itchiness on his penis (glans penis and prepuce). What medication should be stopped?

→ Dapagliflozin.

■ Gliflozin eg, Dapagliflozin (SGLT-2 inhibitors) (for type 2 DM)

→ ↑ risk of genital infections (eg, balanoposthitis = inflammation of the glans penis and prepuce → erythema, itching). → Stop or change medication.

Key 114 Important Notes on Gliflozins (SGLT-2 Inhibitors) “Asked Previously”:

- SGLT-2 inhibitors (Gliflozin) have increased risk for euglycemic **DKA**.
- SGLT-2 inhibitors (Gliflozin) have an important side effect to remember → Genital infections eg, **balanoposthitis** (erythema and itchiness on the penis glans and prepuce).
- In **diabetic** patients who have **heart failure** “HF” with reduced ejection volume
Give → **SGLT2 inhibitors** such as **Dapagliflozin**, **Empagliflozin**
(When **SGLT2 inhibitors** are added to the medications of HF which are **B-blockers**, **ACE inhibitors**, **Aldosterone antagonist** → they **reduce cardiovascular death**). So, in **DM** with **heart failure**, use metformin and **flozin** family

Key 115 A 55 YO lady with osteoporosis and crohn’s disease is on bisphosphonate and azathioprine. She has recently used oral prednisolone for the management of acute flare-up of crohn’s disease. She has recently also used paracetamol and ibuprofen for back pain. Her blood test today is as follows:

Hemoglobin 130 g/L.

WBCs $15 \times 10^9/L$ (4-11).

Platelets $560 \times 10^9/L$ (150-400).

What medication is responsible for her blood results?

→ **Prednisolone**.

- Of the side effects of **prednisolone** (corticosteroids) → **thrombocytosis** and **leucocytosis**.

Glucocorticoids (eg, prednisolone, dexamethasone) → ↑ WBCs, ↑ Platelets.

- This is why prednisolone can be used in the management of the idiopathic thrombocytopenic purpura (as it elevates platelets).

Key
116

☐ If **lithium toxicity** developed (eg, blurry vision, tinnitus = ringing ears, dizziness, lethargy, muscle weakness, diarrhea, vomiting)

→ **Stop lithium and repeat serum lithium level every 6-12 hours** + Supportive care (There is no antidote to lithium toxicity).

When toxicity resolves, lithium can be restarted at a lower dose (Never stop lithium suddenly; it has to be over a period of 3 months to prevent relapse).

Key
117

Some Forms of Herpes Zoster:

☐ Ramsay Hunt Syndrome (Herpes Zoster Oticus) ✓

✓ Reactivation of Varicella Zoster Virus (VZV) in the geniculate ganglion of the **facial nerve (7th CN)** → Facial palsy (ipsilateral facial palsy, loss of taste).

✓ **Otalgia “ear pain”** “First symptom”, Tinnitus, Vertigo, Unilateral Hearing loss, **Painful rash/ vesicles/ blisters around the ear** or on the auditory canal.

✓ Rx → First → **Oral Aciclovir (antiviral)** + **Corticosteroids (eg, prednisolone)**

✓ If lasted for > 3 months, it is called (**post-herpetic neuralgia**). If this occurs

Give → *Amitriptyline* or *Pregabalin* or *gabapentin* or *duloxetine*.

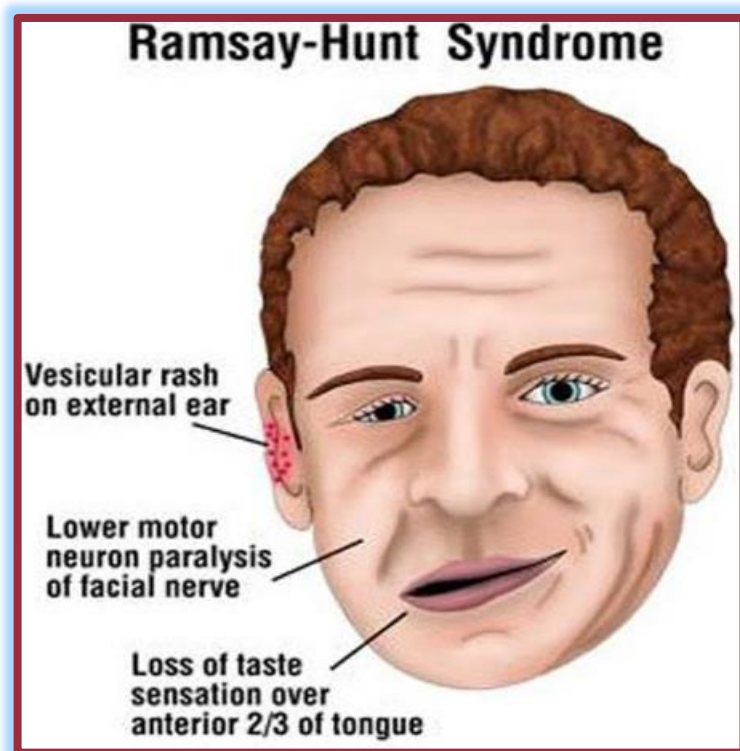
Important Note:

Prednisolone should be started within 2 weeks of symptoms. If The rash and pain persist for **more than 2 weeks**, it is better to add on a neuropathic agent eg, **amitriptyline**, or **gabapentin** or **pregabalin** or **duloxetine**. (They would be more beneficial than prednisolone after 2 weeks of the onset of symptoms).

So:

Aciclovir → up to 2 weeks, add prednisolone → > **2 weeks** and still pain → one of the following: *Amitriptyline* or *Pregabalin* or *gabapentin* or *duloxetine*.

“Generally, **amitriptyline** is preferred over other neuropathic agents”.



☐ Herpes Zoster Ophthalmicus. ✓

✓ Reactivation of Varicella Zoster Virus (VZV) in the Ophthalmic branch of the **Trigeminal nerve (5th CN)**.

✓ Conjunctivitis, Keratitis, Painful Vesicles around the eye ...etc.

✓ Rx → **Oral Aciclovir (antiviral)** + **Corticosteroids (eg, prednisolone)**



Herpes Simplex Ophthalmicus (ophthalmic branch of trigeminal nerve)

Example (1):

A 71-year-old man presents to the GP with intense pain and weakness of the right side of his face for the past 4 days. He has been taking oral aciclovir for the past 4 days but there is still pain that makes him unable to sleep. There are blisters on his right ear canal. What is the most appropriate medication to add on?

→ **Prednisolone.**

- This is most likely a case of **Ramsay Hunt Syndrome (Herpes Zoster Oticus)**.
- Rx → Oral antiviral (eg, **aciclovir**) **[+]** Corticosteroids (eg, **prednisolone**).

✓ If lasted for > 3 months, it is called (**post-herpetic neuralgia**). If this occurs Give → *Amitriptyline* or *Pregabalin* or *gabapentin* or *duloxetine*.

Also, if the pain lasts > 2 weeks, it is more beneficial to give a neuropathic agent (eg, **amitriptyline**) than prednisolone.

Here, it is 4 days only, so add **prednisolone** on.

Example (2):

A 56-year-old man presents to the GP with intense pain and weakness of the right side of his face for the past 4 weeks. He has been taking oral aciclovir for the past 4 weeks but there is still pain that makes him unable to sleep. Additional paracetamol and NSAIDs were not beneficial. There are blisters on his right ear canal. What is the most appropriate medication to add on?

→ **Amitriptyline** or **gabapentin** or **pregabalin** or **duloxetine** (neuropathic agent).

- This is most likely a case of **Ramsay Hunt Syndrome (Herpes Zoster Oticus)**.
- Rx → Oral antiviral (eg, **aciclovir**) **[+]** Corticosteroids (eg, **prednisolone**).

✓ Since the pain is persistent for **> 2 weeks** (4 weeks here) → a neuropathic agent (eg, **amitriptyline**) is more beneficial than steroids.

✓ Steroids are preferred to be given within the first 2 weeks of the infection onset.

Important Note:

Start with oral aciclovir. Prednisolone should be started within 2 weeks of symptoms. If The rash and pain persist for **more than 2 weeks**, it is better to add on a neuropathic agent eg, **amitriptyline**, or **gabapentin** or **pregabalin** or **duloxetine**. (They would be more beneficial than prednisolone after 2 weeks of the onset of symptoms).

So:

Aciclovir → up to 2 weeks, add prednisolone → **> 2 weeks** and still pain → one of the following: *Amitriptyline* or *Pregabalin* or *gabapentin* or *duloxetine*.

“Generally, **amitriptyline** is preferred over other neuropathic agents”.

Key 118 **Antipsychotic medications (eg, **risperidone**) can raise (↑) **prolactin** level**
Leading to → **Galactorrhea** (milk discharge from nipples).

Key 119 **Management of Pain in Sickle Cell Anemia Crisis (Chest Pain):**

- A bolus of strong opioids (usually **morphine**).
- If the pain persists after reassessment:
→ **Another bolus of morphine** is given.

Notes:

✓ **Ibuprofen** (NSAIDs) can be also given.

✓ **Oxycodone** can be considered if morphine is not tolerated (as an alternative and not as an additional medication).

✓ **Pethidine** should be avoided in sickle cell anemia (risk of seizures).

✓ If repeated boluses are needed within 2 hours:

Consider → **Patient controlled analgesia**.

Remember that:

Start with **morphine bolus**

→ Reassess in 30 min, if still in pain → **Repeat morphine bolus**.

Key 120 For any patient who is going to take **erythromycin** or **clarithromycin** (ie, macrolides) and he is on statins (eg, **atorvastatin**, **simvastatin**)
→ **Withhold (stop) statin** for the period of treatment with macrolides.
(Stop, NOT reduce the dose)!

Key 121 **Painful Muscle Spasm** → Give muscle relaxant eg, **Baclofen**
■ This might be asked in the exam: **For example**, a long Scenario of a patient with a history of bone metastasis causing bone pain that is CONTROLLED with morphine but there is still **muscle spasm** that is irritating or painful.

Rx → **Baclofen** (a muscle relaxant can be given as an adjuvant).

▣ **Another example:** A child with cerebral palsy has muscle spasm and increased muscle tone. What medications can help relieve this muscle spasticity? → **Baclofen**.

Another useful medication to know → **Botulinum toxin** (= **botox**).

- **Botulinum toxin**, or **Botox**, is a toxin (protein) that works as a muscle relaxant and stops muscle spasms. It is injected directly into the muscle.
- **Baclofen** is a skeletal muscle relaxant that can be used in muscle spasms that might occur in multiple sclerosis, cerebral palsy, spinal cord injury or after stroke or as an adjuvant with radiotherapy in bone metastasis.

Careful:

Metoclopramide is an antiemetic that blocks dopamine receptors and thus may cause **parkinsonism effect** (eg, **Neck stiffness** and **↑ muscle rigidity**).

If the patient is already with a history of Parkinson's disease (on co-careldopa), metoclopramide can worsen the muscle stiffness and rigidity.

If he is not having Parkinson's disease, metoclopramide may also sometimes cause neck stiffness and increased muscle rigidity.

Another important medication that can cause parkinsonism (eg, neck stiffness, muscle rigidity, tremors) is **aripiprazole** (which is an antipsychotic used in schizophrenia management).

Rx of drug-induced parkinsonism → **Procyclidine** (Anticholinergic).

(**Procyclidine** is an anticholinergic: It can ↓ the effects of the cholinergic excess that resulted from dopamine deficiency caused by metoclopramide).

So, in this case, we give **procyclidine**, not baclofen or botox!

Key
122

SSRIs and Erectile Dysfunction

A 48-year-old man has been having difficulty in achieving erection for the past 2 months. He has been sexually active with his wife for six months. He takes sertraline for depression for 3 months. He is on enalapril (ACE inhibitor) for hypertension. He has a history of taking cannabis and being a heavy alcoholic but he has been abstinent for a year. His testicles size is normal and his current blood pressure is 124/82 mmHg. What is the most likely cause for his erectile dysfunction?

A) History of alcohol and recreational drugs.

- B) History of depression.
- C) Side effects of enalapril.
- D) Side effects of hypertension.
- E) Side effects of sertraline (antidepressants).

Answer → E.

- **All SSRIs can cause erectile dysfunction.** The most common SSRI to cause erectile dysfunction and vaginal dryness → **Paroxetine**.
- SSRIs examples → (**Fluoxetine, Sertraline, Citalopram**).
- Although the other given options “may” also cause erectile dysfunction (HTN, depression, ACE inhibitors, alcohol and recreational drugs), the most obvious and the more common cause of erectile dysfunction among the given options is SSRIs (antidepressants).

Key
123

SSRIs and Hyponatremia → Falls, Instable Gait, Confusion

- One important side effect of **SSRIs** (eg, **sertraline, citalopram, fluoxetine**) is **hyponatremia**.
- If hyponatremia is chronic or if left untreated, it can lead to → **instable gait, recurrent falls, confusion**, and even seizures and coma.

Key
124

Important Medications that Can Cause Dry Non-Productive Cough

✓ **ACE inhibitors** (eg, Ramipril, Lisinopril, Enalapril, Captopril).

✓ **Methotrexate**.

Important Questions:

■ **If a patient is on ACEi for HTN develops a dry cough, what to do?**

→ **Change to Angiotensin receptor blockers (ARBs) eg, Losartan, Candesartan.**

■ **Why Can Dry Non-Productive Cough Develop with Methotrexate?**

✓ Prolonged intake of **methotrexate** (such as in patients with **Rheumatoid Arthritis**) can rarely lead to a severe condition → **Pulmonary Fibrosis/ Pulmonary Toxicity/ Pneumonitis.**

✓ **Pulmonary Fibrosis/ Pneumonitis** → **Dry cough, breathlessness, wheezes, fever. Diffuse bilateral interstitial infiltrates on Chest X-ray may be seen.**

■ **If he is on Methotrexate and develops dry cough, breathlessness, and or wheezes. What to Do Next?**

→ **Discontinue methotrexate.**

→ Refer the patient to the specialist who prescribed methotrexate to look for alternative management (eg, if he was taking methotrexate for rheumatoid arthritis, refer for rheumatology). He also would need PF management.

Other Side Effects of Methotrexate (MTX):

• **Pulmonary toxicity** (Cough, dyspnea, fever) → Stop if suspected pneumonitis.

- **Bone marrow suppression** → Stop MTX if significant ↓ in WBCs/Platelets.
- **Liver and GI** → Stop MTX if abnormal liver enzymes, stomatitis, diarrhea.

Methotrexate (MTX) is an anti-metabolite most commonly used in chemotherapy to treat cancer, and as an immunosuppressant in auto-immune diseases (eg, in rheumatoid arthritis).

Key
125

Scenario on Medication Dose Calculation

A 77-year-old man with a background history of multiple myeloma is in hospital. He is on 10 mg of oral morphine every 4 hours to manage his pain. He is due for discharge. What should be the dose of his slow-release morphine sulphate at home?

He is currently on 10 mg every 4 hours **in hospital**

→ This means (24 hrs / 4 hrs = 6 times).

→ 6 times of 10 mg → $6 \times 10 = 60$ mg morphine per day (per 24 hours).

→ So, his daily dose of morphine in hospital is **60 mg (per 24 hours)**.

Divide it by 2 to be given twice a day **at home**

→ $60 \text{ mg} / 2$

= **30 mg twice a day** of slow-release morphine sulphate.

So, the answer is → **30 mg twice a day**.

Key 126	<div data-bbox="224 180 1495 233" data-label="Section-Header"> First Lines for Ascites Management (eg, liver cirrhosis, cancer) </div> <ul data-bbox="142 306 1299 457" style="list-style-type: none"> • Restrict sodium. • Give diuretics → Spirolactone (the ideal choice of diuretics). <p data-bbox="142 489 1534 583">Spirolactone is an aldosterone antagonist. It is a potassium-sparing diuretic. This means it increases sodium excretion but keeps (preserves) potassium.</p>
Key 127	<div data-bbox="142 699 802 743" data-label="Section-Header"> Osteoarthritis Management in Short </div> <ul data-bbox="142 816 1534 1255" style="list-style-type: none"> • First line → Paracetamol ± Topical NSAIDs. • Second line (if failed) → Add Oral NSAIDs or COX-2 inhibitor (give PPI as well). • If still in pain or NSAIDs are contraindicated → Weak Opioids e.g., Codeine. (Codeine is preferred over tramadol for chronic pain). • If still in pain → Stop weak Opioids and add a strong one e.g., morphine, oxycodone, fentanyl.
Key 128	<div data-bbox="142 1365 367 1409" data-label="Section-Header"> Scenario: </div> <p data-bbox="142 1488 1576 1745">A 54-year-old man presents to the clinic with fatigue and occasional palpitations. His laboratory investigations show low serum sodium and high serum calcium. He has been on indapamide for the past 3 years for hypertension. He is also on vitamin D supplements for vitamin D deficiency. What is the most likely cause for his hyponatremia and hypercalcemia?</p> <p data-bbox="142 1808 513 1852">A) Addison's disease.</p>

- B) Cushing's syndrome.
- C) Vitamin D deficiency.
- D) Vitamin D toxicity.
- E) Thiazide-induced hypocalciuria.

Answer → E.

✓ **Thiazide diuretics (eg, indapamide)** → can cause hyponatremia. They can also reduce the renal excretion of calcium, leading to hypercalcemia.

✓ **Addison's** → hyponatremia and hyperkalemia (not hypercalcemia).

✓ **Cushing's** → hypernatremia and hypokalemia.

✓ **Vitamin D deficiency** → Hypocalcemia (not hypercalcemia).

✓ **Vitamin D toxicity** → Hypercalcemia (but nothing to do with hyponatremia).

Key
129

Management of Constipation

☐☐ Impacted stool → **Phosphate Enema**.

However, if young, healthy, no comorbidities, try **Glycerol suppositories** first. "important".

☐☐ Hard stool but not impacted → **Stool softeners**.

☐☐ Constipation with soft stools

→ **High fibre diet** → **Senna = (stimulant laxatives)** (1st line),

→ **Lactulose or Macrogol** (ie, **osmotic laxatives**) (2nd line) in general.

☐☐ Pregnancy with constipation →

✓ **First line** → **Lspaghula husk** (bulk-forming laxative).

✓ **Second line** → **Lactulose** (osmotic laxative).

✓ **Third line** → **Senna** (stimulant laxative).

ie, lactulose is preferred over senna in pregnant women.

☐☐ Constipation in Palliative Care Patients**■ For most cases of chronic constipation in palliative patients**

→ **Macrogol** (osmotic laxatives). (each sachet is dissolved in half a glass of water).

■ For opioid-induced constipation

• → **Senna** (could be given tablets or syrup based on the ability to swallow).

• Another option → **Bisacodyl** (per-rectal suppository).

✓ Both senna and bisacodyl are (stimulant laxatives).

✓ Senna is preferred in those who can swallow (either syrup or tablets) because it is easier to use regularly.

✓ Bisacodyl suppository has a faster onset of action but because it is a suppository, it is less preferred.

✓ Avoid senna and bisacodyl (stimulant laxatives) in bowel obstruction.

Key 130 Important Possible Side Effects of Salbutamol to Remember

→ Transient **hypokalemia** (low serum potassium).

Others → Tachycardia/ Palpitations/ Muscle twitching, tremors/ Shaky hands.

Key 131	<p data-bbox="142 258 862 306">Important Side Effects -Recently Asked-</p> <ul data-bbox="142 380 1588 766" style="list-style-type: none"><li data-bbox="142 380 1307 428">■ Oxybutynin (anticholinergic) can cause dry eye and dry mouth.<li data-bbox="142 499 1588 594">■ Spironolactone (aldosterone antagonist) can cause breast enlargement (gynecomastia).<li data-bbox="142 665 1588 766">■ Citalopram, Fluoxetine (SSRIs) can cause Hyponatremia (SIADH) → confusion, lethargy.
Key 132	<p data-bbox="142 875 683 924">A calculation Scenario</p> <p data-bbox="142 997 1588 1102">A 37-year-old man with scabies need to be give oral ivermectin 200 microgram per kilogram. His weight is 70 kg. What is the total dose to be given in mg?</p> <p data-bbox="142 1155 899 1203">1000 microgram (mcg) = 1 milligram (mg).</p> <p data-bbox="142 1276 651 1325">200 X 70 = 14000 microgram</p> <p data-bbox="142 1350 776 1398">14000/1000 = 14 milligram (14 mg).</p>

Key
133

Drug-Induced Parkinsonism

◆ Scenario:

- A 65-year-old woman experiences increasing hand tremors and bradykinesia after being prescribed risperidone for schizophrenia.
- Examination reveals significant motor symptoms.
- Which part of the brain is most likely being affected to cause these motor symptoms?

◆ Explanation:

- **Risperidone** is an antipsychotic that can cause **extrapyramidal symptoms** such as bradykinesia and tremors.
- These symptoms are characteristic of **drug-induced parkinsonism**.
- The **striatum** is primarily affected because it is the main region where dopamine from the substantia nigra acts.
- Risperidone blocks dopamine receptors in the striatum, disrupting motor control and leading to the observed symptoms.

◆ Why Striatum; not Substantia Nigra?

- The substantia nigra produces dopamine, but the striatum is the primary site where dopamine acts to regulate movement.

- The blockade of dopamine receptors by risperidone in the striatum directly causes the motor symptoms, making the striatum the correct answer.

◆ Other Drugs Causing Drug-Induced Parkinsonism:

Risperidone - Haloperidol - Metoclopramide - Prochlorperazine.

◆ Do These Drugs Have the Same Effect on the Striatum?

Yes, Haloperidol, Metoclopramide, and Prochlorperazine all **block dopamine receptors in the striatum**.

◆ If the patient has Parkinson's disease, not drug-induced parkinsonism (e.g., due to risperidone, like in this scenario), which part of the brain is most likely being affected to cause these motor symptoms? Would it still be striatum or substantia nigra?

In **Parkinson's disease**, the primary pathology is the **degeneration of dopamine-producing neurons in the substantia nigra**.

The loss of these neurons reduces dopamine input to the striatum, leading to the characteristic motor symptoms.

Therefore, in Parkinson's disease, the substantia nigra is the most likely part of the brain being affected to cause these motor symptoms.

So: Parkinson's → Substantia nigra | drug-induced parkinsonism → Striatum.

♦ Important Side Effects of Risperidone to Remember:

- Extrapyrimal symptoms (eg, tremors, bradykinesia),
le, **drug-induced parkinsonism**.
- Weight gain. • Sedation.
- **Elevated prolactin** levels, which can cause **galactorrhea** (milk discharge from nipples).

Key
134

A Scenario on A Medication that Causes Fall

A 78-year-old woman presents to the GP surgery after experiencing two falls over the past month. She reports feeling unsteady on her feet, especially when getting out of bed at night. She denies any loss of consciousness or visual disturbances but mentions feeling light-headed on occasion. Her medical history includes hypertension, for which she takes ramipril and amlodipine, type 2 diabetes managed with metformin and sitagliptin, and chronic insomnia, for which she has been prescribed zopiclone. Her blood pressure is 135/80 mmHg when measured sitting, but when she stands, it drops to 125/75 mmHg. She denies any recent changes to her medications, and her full blood count and electrolytes are within normal limits. Her ECG is unremarkable. Which of the following is the most likely cause of her falls?

A) Amlodipine.

B) Sitagliptin.

C) Metformin.

D) Ramipril.

E) Zopiclone.

Answer:

The most likely cause of the patient's falls is **zopiclone** (Option E). Zopiclone is a **sedative-hypnotic** medication used to treat insomnia, and it is known to cause **drowsiness, impaired coordination, and dizziness**, particularly in elderly patients. These effects increase the risk of falls, especially at night when patients get out of bed. In this case, the woman reports feeling unsteady at night, which is consistent with the sedative effects of zopiclone.

- **Ramipril** (Option D) can cause **orthostatic hypotension**, but in this case, the patient's blood pressure drop on standing is minimal and unlikely to be the primary cause of her falls.
- **Amlodipine** (Option A), **sitagliptin** (Option B), and **metformin** (Option C) are not commonly associated with an increased risk of falls due to dizziness or drowsiness.

Key Points:

- **Zopiclone** can cause **drowsiness** and **impaired coordination**, increasing the risk of falls, particularly in elderly patients.
- Falls typically occur at night when getting out of bed, as seen in this scenario.
- While **ramipril** can cause **orthostatic hypotension**, the patient's blood pressure change on standing is minimal, making zopiclone the more likely cause.

When will ramipril be the valid answer in this scenario?

Ramipril would be the valid answer if the patient's **blood pressure drop on standing** (*orthostatic hypotension*) was **more significant**. In scenarios where the patient experiences a **larger drop in blood pressure** when transitioning from sitting to standing (e.g., a **drop greater than 20 mmHg in systolic pressure** or **10 mmHg in diastolic pressure**), **ramipril** would likely be the cause of the falls due to its known side effect of **postural (orthostatic) hypotension**.

Key
135

Quick Revision Key Notes on Pharmacology:

- **Zopiclone** can cause **drowsiness, dizziness, and impaired coordination**, increasing the risk of falls, especially in elderly patients at night when getting out of bed.
- Pick **Zopiclone** if falls occur at night or the patient feels unsteady when getting up from bed, **without significant blood pressure drops**.
- **Ramipril** and other **ACE inhibitors** can cause **postural hypotension** (a drop in blood pressure when standing), leading to dizziness and falls in elderly patients.
- Pick **Ramipril** if there is a significant **systolic blood pressure (SBP)** drop of more than **20 mmHg** or **diastolic blood pressure (DBP)** drop of more than **10 mmHg** upon standing, indicating **orthostatic/ postural hypotension**.
- **Furosemide** (a loop diuretic) often causes both **low sodium (hyponatraemia)** and **low potassium (hypokalaemia)**, resulting in muscle weakness, cramps, and fatigue.
- While **sertraline** can also cause **hyponatraemia**, it does **not cause hypokalaemia**. If a patient has both **hypokalaemia and hyponatraemia** and is

on both sertraline and furosemide, pick **furosemide** as the likely causative medication.

- **Sertraline** can cause **hyponatraemia** due to **SIADH**, leading to **confusion**, **dizziness**, and **lethargy**.

- **Example**: A patient on sertraline develops confusion, dizziness, and lethargy

→ Consider **hyponatraemia** due to **SIADH**. SIADH is induced by sertraline -SSRI-.

- **Doxycycline** should be taken **after meals** to avoid **oesophageal irritation** and **heartburn**, which can occur if taken on an empty stomach.

- **Statins** should be **withheld ie, stopped temporarily** when patients are prescribed **Clarithromycin** or **Erythromycin** to avoid **increased statin toxicity**, including the risk of rhabdomyolysis. (Statins should be temporarily stopped until the antibiotic course is completed).